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PUBLIC DOCUMENT..... .....No. 39.

REPRINT OF

FIRST ANNUAL REPORT

OF THE

STATE BOARD OF HEALTH

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OF

MASSACHUSETTS.

THE PROPERTY OF THE NEW YORK HOSPITAL

JANUARY, 1870.

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79 MILK STREET (CORNER OF FEDERAL).
1870.

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Commonwealth of Massachusetts.

This First Report of the State Board of Health of Massachusetts, was presented to the Legislature soon after the organization of the Board. For several years past, it has been impossible to procure copies for the use of libraries and individuals wishing to complete their series of Reports. The Legislature of 1874 consequently passed the following order:—

HOUSE OF REPRESENTATIVES, May 6, 1874.

Ordered, That three thousand copies of the First Annual Report of the State Board of Health be printed, for distribution from time to time, as occasion may offer, by the Board.

Adopted May 7, 1874.

GEO. A. MARDEN, *Clerk*.

26639

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Commonwealth of Massachusetts.

STATE BOARD OF HEALTH,
January 10, 1870.

To the Honorable the Senate and House of Representatives.

We congratulate the legislature on the fact that the comprehensive idea included under the term of "State Medicine" has at length been established in Massachusetts.

We feel the responsibilities of the position that we hold. We accept them with an earnest wish to be able to grapple successfully with the various difficulties that surround the commencement of this very important branch of the public service.

In accordance with the law passed June 21, 1869, we now present the First Annual Report of the State Board of Health.

GENERAL PRINCIPLES OF ACTION.

Before proceeding to its details, we desire to give the general principles upon which we have acted in its preparation.

No board of health, if it rightly perform its duty, can separate the physical from the moral and intellectual natures of man. These three qualities of man are really indissoluble, and mutually act and react upon each other. Any influence exerted to the injury of one, inevitably, though perhaps very indirectly, injures another. As in the physical world there is a correlation of forces, so that no force is ever lost, but only interchanged with another, so do these various powers and qualities of man act upon each other, and act and are acted on by the physical forces of nature that surround him.

By the careful and comprehensive study of these various laws and of their relations, the highest department of the

physician's art is brought into operation. But no man or private body of men has the ability to study and to develop this department as a free Commonwealth can do when acting through the agency of a few persons who are devoted to this object, and who come willingly to the work, and armed with the power and the ample means of the State. Hence the term "State Medicine," though criticised by some, becomes a most appropriate and terse expression of the position which our Commonwealth has now assumed.

From the earliest colonial days, the general court has assumed to itself the right to prescribe rules for the intellectual and moral health of the people. The aids given to our colleges and to our primary and normal schools, and recently by authorizing the establishment of public libraries by cities and towns, all testify to the labors of the Commonwealth in reference to these two of the above-named powers of man. But it may well be doubted whether, in the earnest desire to stimulate the intellectual powers of its people, the State has not neglected somewhat the moral, and almost wholly lost sight of the physical nature of man.

The State Board of Health, according to our estimate of its objects, should neglect none of these three, and if, in this or any future report, it should study any supposed evil upon man, it will adopt the fine old maxim, pagan though it be, that nothing which pertains to humanity, in its widest sense, will this Board deem foreign to its aims.

We have thought it well thus to lay down certain general principles upon which we intend to act.

We now pass to a brief statement of what has been done by the Board since its organization in September.

Secretary's Report.

In the Secretary's report will be found the account of the organization of the Board, and a summary of its doings to the present time; also allusions to certain nuisances, in which he has been already able to be of service as an unbiassed umpire under State authority. His remarks about the necessity of having some room provided for business of the Board, and also upon the propriety of the Board reporting in future in print, we commend to the notice of the legislature.

It was the unanimous opinion of the Board that it would be better to study a few questions only, and to do so thoroughly, rather than to waste time by running over a larger field, including many important subjects, but none of which could be examined in an exhaustive manner during the time left before the close of the year. Accordingly it was decided to take up the three following

Special Questions.

1. Sale of Poisons.

What should be done in reference to the sale of poisons, in order to prevent, if possible, the frequent occurrence of death from these substances being sold by boys and men ignorant of pharmacy, or careless in the dealing out of these dangerous drugs?

After mature consideration of the subject, the Board came to the conclusion that, although the present law relative to the sale of poisons is really useless, there could not be, from the very nature of the case, any law devised restraining the sale of articles specially designated that would not in like manner become useless in a short time.

Therefore the Board feel that the promotion of a high education among apothecaries and their assistants, and, as far as possible, by legislation, the prevention of ignorant and unscrupulous persons from practising the apothecary's art, are the best modes of dealing with the subject. The specific methods to be pursued by legislation to gain these ends must be left to the wisdom of the general court.

2. Slaughtering for the Boston Market.

We commend this report to the candid and close attention, not only of the legislature, but also of the inhabitants of those towns in which slaughter-houses are found. For although deaths, for various reasons, may not be more numerous in these towns than in others, it seems to the Board highly improper to wait until such results are reached, as they inevitably will be if the present evil in the management of this business be allowed to go onward unchecked. Besides, we have reason to believe, that although an excessive number of deaths may not be found in these towns, it by no means fol-

lows that there may not be numerous slighter and persistent discomforts, and many actual derangements of the system, which are unknown to our State registration.

When, therefore, we consider that slaughter-houses, as conducted in the vicinity of Boston, are nuisances now, and that they will become greater ones hereafter, and that all large cities like London, Paris, and, more recently, New York, have found it advisable to build abattoirs for slaughtering, it may well be questioned whether the legislature would not be doing wisely if it were to allow the inhabitants of towns thus tainted either to build such abattoirs at the public expense, or authorize private enterprise to do so. Should this be accomplished by either method, we know from the experience of other cities that nothing but good will result, while at the same time waste, which is now very great, will be prevented, and money will thus be saved.

The report fully sustains these remarks.

3. Comparison of Model Lodging-Houses and Common Tenement Houses—their relative effects upon the Health and Morals of the People.

The Board regrets that it cannot complete this investigation in time for the present Report, but proposes to pursue the inquiry during the coming year. The Board, however, cannot dismiss this subject, without bringing to the notice of philanthropists some facts already brought out, viz., that the model lodging-house, while giving to the poor at a very cheap rent a perfectly clean though humble home, with all the appliances of modern civilization, thus doing much towards promoting temperance and all the domestic virtues, really gives a good return to capital in a six per cent. interest as *net* profit for the money thus expended. Surely these buildings are among the most satisfactory of the many benevolent undertakings this age has seen.

Cheap Homes for the Poor imperiously called for at the Present Time.

At the present time cheap homes for the poor are *imperiously called* for in Boston, owing to the sudden destruction of Fort Hill, whereby very large numbers have been thrown from homes they have for years inhabited.

Information on Health for the People.

By law we are required from time to time to give information to the people respecting health. In accordance with that proviso, the Board decided to publish for more general distribution some remarks made by our Secretary before the Boston Social Science Association, as subsequently modified and extended by him. There is one subject named therein to which the Board wishes to draw especial attention, viz. :

The Earth Closet.

This is one of the simplest and yet one of the most useful discoveries of modern times. Hereafter, if we are wise, we shall apply this simple means for the purification of vaults in every place where water is not used for that purpose, as in our great cities. In the country it will be invaluable. And whenever in private homes cholera or typhoid fever or any contagious disease may occur, there should this principle involved in the Earth Closet be adopted.

The Use of Intoxicating Liquor, as a Beverage.

The fourth section of the Act establishing this Board reads as follows :—

"It shall be the duty of the board, and they are hereby instructed, to examine into and report what in their judgment is the effect of the use of intoxicating liquor, as a beverage, upon the industry, prosperity, happiness, health and lives of the citizens of the state. Also what additional legislation, if any, is necessary in the premises."

This opens to the Board of Health a very wide field of investigation and inquiry; one over which the advocates of opposite opinions upon the questions involved, have carried on an animated, not to say bitter, controversy for many years.

It seemed to the Board that, upon questions which have so long engrossed public attention, and about which scientific and professional men and legislators differ so widely, any opinions or judgments of this Board, to be of value, should be formed and published after a full and careful reëxamination of facts and arguments, which alone can be the proper grounds of such opinions and judgments.

The time since the organization of the Board has been entirely insufficient for making such necessary examination.

With more time and ampler opportunities the Board hope to be able hereafter to present such facts and conclusions as may be of some service to the citizen in the conduct of life, and to the legislator in the discharge of his responsible duty.

Nuisances, and the doings of the Board thereupon.

Among the nuisances mentioned in the Secretary's report and which the Board was called on to examine, was one relative to the places used as "lock-ups." The subject is one well worthy the consideration of the legislature, for certainly many places for the detention of persons accused of crime now exist in this Commonwealth, which are unfit for any human being to stay in even for a few hours.

Expenses of the Board.

It will be seen that the expenses of the Board have fallen far within the limit generously granted by the State. It is hoped that the same liberality evinced last year by the legislature will be shown in the future. The Board intends, by employing learned experts and others to make special investigations, to be able to render their own reports of much greater value. For this purpose funds will be needed.

No Room for Board Meetings.

The Board regrets to say that it has yet no room appointed for its use. The Secretary has been compelled to use his own private office for public work. During the session of the legislature we have absolutely no place for our meetings; the room in which we have hitherto met being then needed as a committee room. We ask the aid of the general court to supply this want.

All which is respectfully submitted.

HENRY I. BOWDITCH.
GEORGE DERBY.
P. EMORY ALDRICH.
WM. C. CHAPIN.
WARREN SAWYER.
R. FROTHINGHAM.
R. T. DAVIS.

REPORT OF THE SECRETARY.

To the State Board of Health:—

GENTLEMEN:—The following history of the Board will explain, in a connected form, the kind of work in which we have been engaged since our organization.

ESTABLISHMENT OF THE BOARD.

The Act establishing a State Board of Health in Massachusetts is as follows:—

AN ACT to establish a State Board of Health.

SECTION 1. The governor, with the advice and consent of the council, shall appoint seven persons who shall constitute the Board of Health and Vital Statistics. The persons so appointed shall hold their offices for seven years: *provided*, that the terms of office of the seven first appointed shall be so arranged that the term of one shall expire each year, and the vacancies so created, as well as all vacancies occurring otherwise, shall be filled by the governor with the advice and consent of the council; but any one may be reappointed.

SECT. 2. The board shall take cognizance of the interests of health and life among the citizens of this Commonwealth. They shall make sanitary investigations and inquiries in respect to the people, the causes of disease, and especially of epidemics, and the sources of mortality and the effects of localities, employments, conditions and circumstances on the public health; and they shall gather such information in respect to those matters as they may deem proper, for diffusion among the people. They shall advise the government in regard to the location of any public institutions. They shall, in the month of January, make report to the legislature of their doings, investigations and discoveries during the year ending December thirty-first, with such suggestions as to legislative action as they may deem necessary.

SECT. 3. The board shall meet at the state house once in three months, and as much oftener as they may deem expedient. No

member, except the secretary, shall receive any compensation, but the actual personal expenses of any member while engaged in the duties of the board shall be allowed and paid.

Sect. 4. It shall be the duty of the board, and they are hereby instructed, to examine into, and report what, in their best judgment, is the effect of the use of intoxicating liquor as a beverage, upon the industry, prosperity, happiness, health and lives of the citizens of the state. Also what additional legislation, if any, is necessary in the premises.

Sect. 5. The board shall elect a secretary, either from their own number, or otherwise; but when elected he shall be a member of the board, and their executive officer. He shall perform and superintend the work prescribed in this law, and such other duties as the board may require. He shall receive from the treasury, in quarterly payments, an annual salary of twenty-five hundred dollars, and his necessary travelling expenses incurred in the performance of official duties, after they have been audited by the board and approved by the governor and council, and all other necessary expenses arising in his office shall be paid out of the treasury in the same manner as those of the different departments of the government.

Sect. 6. This act shall take effect upon its passage. [*June 21, 1869.*

In accordance with the provisions of this Act, His Excellency the Governor, with the advice and consent of the council, appointed the following named persons to constitute the State Board of Health, their commissions bearing date July 31, 1869:—

Henry I. Bowditch,	*for seven years.*
George Derby,	*six years.*
P. Emory Aldrich,	*five years.*
William C. Chapin,	*four years.*
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Richard Frothingham,	*two years.*
Robert T. Davis,	*one year.*

The first meeting of the Board was held at the State House, September 15, 1869, on which occasion the senior member, Dr. Bowditch, made the following address:—

Gentlemen of the State Board of Health:

By the orders of the Governor of the Commonwealth, it devolves upon me to call you together. As the subject-matters for our discussion may be somewhat indefinite in all of our minds, I take the liberty of addressing a few words to you, in order that you may know not only what I consider the general nature of our duties, but may also understand how high I place these duties when I consider them in their relations to the present and future health of the citizens of the State. I may be mistaken in my estimate of the importance of the movement, the commencement of which to-day devolves upon us. I confess to you that I know of no higher office in the State than that which we now hold, viz., that of inaugurating the idea of "State Medicine" in Massachusetts. Upon our high or low appreciation of the position and of the duties resulting from that position, and upon our wise or foolish performance of these duties, depends the success of the object aimed at in the establishment of a State Board of Health. The last legislature, unconsciously, perhaps, on the part of many members thereof, has proposed a system that may be made by us capable of good to the citizens in all future time, or it may prove a perfect abortion. Our work is for the far future as well as for the present, and at this very opening of our labors we should try to place ourselves above the region of merely local or temporary excitement or of partisan warfare, in order that we may act wisely and for the ultimate good of the whole people.

In these introductory general remarks, as you will see, my object has been to impress upon you my views of the essential dignity of the offices we now hold, and that we should assume them with minds loyal to the truth and under a sense of individual responsibility in the premises.

I have used one expression about which I wish to enter into some detail, viz., "State Medicine in Massachusetts." What is the precise meaning of the expression. It is of very recent growth in our language. It has, in fact, arisen, I believe, within the last few years in England, where already it has become a great power for good. Its objects rank among the most important matters now discussed by the highest intellects and humanest hearts in Great Britain. It is, as I understand it, a special function of a state authority, which, until these later days of scientific investigation, has been left almost wholly unperformed, or exercised only under the greatest incitements to its operation, such as the coming of the plague, cholera, small-pox, or some other equally malignant dis-

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I have used one expression about which I wish to enter into some detail, viz., "State Medicine in Massachusetts." What is the precise meaning of the expression. It is of very recent growth in our language. It has, in fact, arisen, I believe, within the last few years in England, where already it has become a great power for good. Its objects rank among the most important matters now discussed by the highest intellects and humanest hearts in Great Britain. It is, as I understand it, a special function of a state authority, which, until these later days of scientific investigation, has been left almost wholly unperformed, or exercised only under the greatest incitements to its operation, such as the coming of the plague, cholera, small-pox, or some other equally malignant dis-

member, except the secretary, shall receive any compensation, but the actual personal expenses of any member while engaged in the duties of the board shall be allowed and paid.

Sect. 4. It shall be the duty of the board, and they are hereby instructed, to examine into, and report what, in their best judgment, is the effect of the use of intoxicating liquor as a beverage, upon the industry, prosperity, happiness, health and lives of the citizens of the state. Also what additional legislation, if any, is necessary in the premises.

Sect. 5. The board shall elect a secretary, either from their own number, or otherwise; but when elected he shall be a member of the board, and their executive officer. He shall perform and superintend the work prescribed in this law, and such other duties as the board may require. He shall receive from the treasury, in quarterly payments, an annual salary of twenty-five hundred dollars, and his necessary travelling expenses incurred in the performance of official duties, after they have been audited by the board and approved by the governor and council, and all other necessary expenses arising in his office shall be paid out of the treasury in the same manner as those of the different departments of the government.

Sect. 6. This act shall take effect upon its passage. [*June 21, 1869.*

In accordance with the provisions of this Act, His Excellency the Governor, with the advice and consent of the council, appointed the following named persons to constitute the State Board of Health, their commissions bearing date July 31, 1869:—

Henry I. Bowditch, ...	*for seven years.*
George Derby, ...	*six years.*
P. Emory Aldrich, ...	*five years.*
William C. Chapin, ...	*four years.*
Warren Sawyer, ...	*three years.*
Richard Frothingham, . . .	*two years.*
Robert T. Davis, ...	*one year.*

The first meeting of the Board was held at the State House, September 15, 1869, on which occasion the senior member, Dr. Bowditch, made the following address:—

Gentlemen of the State Board of Health:

By the orders of the Governor of the Commonwealth, it devolves upon me to call you together. As the subject-matters for our discussion may be somewhat indefinite in all of our minds, I take the liberty of addressing a few words to you, in order that you may know not only what I consider the general nature of our duties, but may also understand how high I place these duties when I consider them in their relations to the present and future health of the citizens of the State. I may be mistaken in my estimate of the importance of the movement, the commencement of which to-day devolves upon us. I confess to you that I know of no higher office in the State than that which we now hold, viz., that of inaugurating the idea of "State Medicine" in Massachusetts. Upon our high or low appreciation of the position and of the duties resulting from that position, and upon our wise or foolish performance of these duties, depends the success of the object aimed at in the establishment of a State Board of Health. The last legislature, unconsciously, perhaps, on the part of many members thereof, has proposed a system that may be made by us capable of good to the citizens in all future time, or it may prove a perfect abortion. Our work is for the far future as well as for the present, and at this very opening of our labors we should try to place ourselves above the region of merely local or temporary excitement or of partisan warfare, in order that we may act wisely and for the ultimate good of the whole people.

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I have used one expression about which I wish to enter into some detail, viz., "State Medicine in Massachusetts." What is the precise meaning of the expression. It is of very recent growth in our language. It has, in fact, arisen, I believe, within the last few years in England, where already it has become a great power for good. Its objects rank among the most important matters now discussed by the highest intellects and humanest hearts in Great Britain. It is, as I understand it, a special function of a state authority, which, until these later days of scientific investigation, has been left almost wholly unperformed, or exercised only under the greatest incitements to its operation, such as the coming of the plague, cholera, small-pox, or some other equally malignant dis-

case. By this function the authorities of a state are bound to take care of the public health, to investigate the causes of epidemic and of other diseases, in order that each citizen may not only have as long a life as nature would give him, but likewise as healthy a life as possible. As the chief object of the physician is the cure, if possible, of any ailment which is submitted to his care, so the far higher aim of State Medicine is, by its thorough and scientific investigations of the hidden causes of diseases that are constantly at work in an ignorant or debased community, to prevent the very origination of such diseases. Much has already been suggested in England towards the crushing out of fevers, &c. Still more recently one of the grandest results of the State Medicine is its virtual recognition under international law, by the appointment of joint governmental commissioners for the investigation and prevention of the spread of Asiatic cholera.

The history of State Medicine in Great Britain may be briefly summed up as follows:—

Only twenty-one years ago, *i. e.* in 1848, England, stimulated by the medical profession and the philanthropists, passed an Act establishing a "General Board of Health." It gave very extensive powers, and statements of its doings from year to year were published by Parliament. The Registrar-General's reports also tended to open the eyes of all to the importance of more thoroughness of work.

In the early part of 1858, the Privy Council of England was directed to consider the matter of public health. Accordingly its chief medical officer, Mr. Simon, one of the most eminent of the medical profession of London, was ordered to report to the council on any matters pertaining to that subject. Every year since then he has sent out, under official sanction, very valuable documents. He has been allowed to call to his aid all the special talent in the kingdom; and investigations of importance, not only to the state, but to the science of medicine, have been annually made and published by the council. And I beg you to bear in mind that all these investigations have been made by the state with one sole object in view, viz., the improvement in human health, and for the lengthening out of human life of each individual man or woman. Certainly no object can be nobler, none more deserving the attention of learned men or of philanthropists or statesmen.

Dr. Farr (*Medical Times and Gazette*, July 31, 1875), in his very recent and able address as president of the section on State Medicine in the British Medical Association, makes the following lines of thought upon this subject:—"Public hygiene is a want as much as air, and public roads and waters are public necessities, and as such

must be cared for and paid for by the community." Diseases as disastrous as those among the Greek hosts before Troy, befel the English camp in the Crimea. Before Troy, appeals by prayer were made to appease the anger of the gods; but God's divine laws of hygiene were unknown or uncared for. During the Crimean war the people of England not only prayed, but with indignant haste they hurled from power an inefficient ministry because it neglected these same laws. Out of this upheaval of the nation's heart arose Florence Nightingale and Lord Herbert, with their Christian sanitary law, bringing health and comparative comfort to the war-worn soldier.

"A sanitary code," says Dr. Farr, "is needed, with proper sanitary officers; for otherwise a code would be a dead letter." Hence, continues he, "a Ministry of Public Health will eventually be needed for the British Empire." I would remark, in passing, that Jeremy Bentham suggested in his "Constitutional Code" the same idea more than thirty years ago. "Such a ministry," says Dr. Farr, "would divide itself into four departments—administration, medicine, engineering, statistics—each of which should be organized so as to work in harmony with a council of health and executive heads. Each town should have its board of health and its health physician in communication with and in aid of the Central Board of Health."

But public health has so wide a field that help is needed from all; from the chemist, the engineer, the naturalist, and from the humblest citizen as well as the highest statesman.

"The primary object of public medicine," says Dr. F., "is to prevent disease, but it also surrounds the sick with conditions most favorable to recovery, and diminishes the death-roll of the people."

Dr. Farr concludes his admirable address with the following thought:—"Supposing every condition favorable for the perfect operation of the powers of State Medicine, we should still see grave defects in many persons; shortcomings in others; in many, organic degeneracies; in many, criminal depravities."

"How out of the existing seed to raise races of men to divine perfection is the final problem of public medicine."

You see, gentlemen, from these memoranda taken from Dr. Farr's address, that I am not alone in considering the objects we have to care for as among the highest that can be presented to any reasonable man, or to any lover of his race.

The establishment of our Board by the last general court inaugurates this system of State Medicine in Massachusetts. I think

that this is the first State Board of Health established by any American State; at least, with objects as extensive as those now given to our charge.

The law under which we act, while not specifying so much as the English law of 1848, gives us the amplest powers for investigation and funds at our disposal for any legitimate purpose.

Let us look for a moment at some of the general objects and duties involved in the Act establishing our Board.

First. It directs the Board to take cognizance of everything tending to public health, and of course requires us to endeavor to eradicate everything tending to public disease and death.

Second. It directs us to diffuse, among the people a knowledge of the means of obtaining individual and public health and of preventing disease.

Third. We are ordered to investigate the effects of the use of intoxicating liquors upon the industry, prosperity, happiness, health and lives of the people, and it is intimated that we may suggest legislation on any or all of the subjects committed to us for investigation.

Now in order that the workings of the Board may become harmonious and of real service, it is a self-evident proposition that exact methods of procedure must be followed in all cases, and that certain by-laws for the legal governance of the Board will be necessary, and which shall not be varied from except under special directions at a full meeting of the Board.

[Dr. Bowditch then proceeded to suggest certain plans for the organization of the Board, and continued as follows:—]

The law requires us to diffuse among our people any already established laws of public health, and also whatever we may hereafter discover on that subject. I look upon this feature of the law with deep interest, for I believe by it we *may* do much service to the people.

How shall we diffuse this knowledge? Permit me to allude to a few evident methods.

(a.) By lectures from our Secretary or from members of the Board on various special subjects connected with public hygiene—such as ventilating, and building, and location of houses; on various well-known diseases capable of partial or entire prevention on knowledge of causes being given. It may be a question, moreover, whether we should not authorize the Secretary to communicate with lecture committees of various towns and the American Literary Bureaus, and to make arrangements with physicians and

others to deliver lectures relating to public health in various towns.

(*b.*) By the Secretary holding meetings in the various parts of the State for discussions on the subject; meetings analogous to those now held on education, agriculture, &c. He might invite the coöperation of local medical societies or special physicians. I have no doubt that such meetings, properly conducted, would attract the attention and interest of the public.

(*c.*) By the publication in a compact form and the wide circulation of the pith, so to speak, of our general knowledge on public hygiene. How this should be done would remain an open question. If it could be done, there is no doubt of the good that would eventually result.

(*d.*) By our annual reports to the legislature, which, I trust, will always be models of brevity and of compact learning—not a word too much or a word for effect merely—and so thoroughly indexed that even the busiest man on 'change can in three minutes get at the essentials, and be prepared to study the details of any part or parts he may wish further to examine.

In conclusion, gentlemen, let me say that, while I feel alike our grave responsibilities and the dignity conferred on each one of us by His Excellency the Governor in his selection of us for these offices, I have at the same time no misgivings; but on the contrary, the liveliest hope that this Board will faithfully and in an able manner perform its duties, and that thus it will become a real blessing to our State, not only at the present time, but long after every member of it has died. It will assuredly be such if we, the necessary originators of its various details, only look at our duties in the light of the broadest philanthropy and, as far as in us lies, the wisest statesmanship, and finally with all the knowledge that modern science can at present give us.

In making these introductory remarks, I have done only what seemed to be proper; but I hope that others will speak what seems to them good, so that starting on our new career with understanding minds and buoyant and willing hearts, we may vigorously inaugurate State Medicine in Massachusetts.

At a subsequent meeting on the 22d of September the following By-laws were adopted for the government of the Board.

By-Laws.

1. A chairman and a secretary for the Board shall be chosen by ballot.

2. Regular meetings of the Board shall be held at the State House, in Boston, on the first Wednesday of January, April, July and October, at eleven, A. M.

3. At the meeting in January the chairman and secretary shall be chosen, to hold their offices during the ensuing year.

4. Special meetings may be called at any time by the chairman, or at the request of any two members.

5. Four members shall constitute a quorum for the transaction of business.

At the same meeting the organization of the Board for the remainder of the year was completed by the choice of Henry I. Bowditch as chairman, and George Derby as secretary.

In considering the nature of their duties, as defined by the Act, it seemed to the Board expedient to select certain subjects for investigation during the short time which remained before report was to be made to the legislature, and to leave all others for the present, except such as might be brought before them requiring immediate action. From among a large number of subjects proposed for examination the following were selected:

Subjects Selected for Special Investigation.

1. The prevailing modes of slaughtering, with especial reference to the supplies of fresh meat for Boston market.

2. The sale of poisons.

3. Compliance with the instructions contained in the fourth section of the Act establishing the Board, relative to the effects of the use of intoxicating liquor.

4. A comparison of the amount of sickness and mortality in different kinds of houses occupied by the poor.

In addition to these subjects for special investigation, it was determined,—

5. To address a circular to the local boards of health throughout the State as to their powers and duties under existing laws; and,

6. To collect and publish weekly the number of deaths, and their prevailing causes, in the most populous cities and towns of the State.

The result of this plan will appear in the following pages, which contain reports upon the first and second subjects designated, and in their preparation every member of the Board has participated. The third subject, relating to the effects of intoxicating drinks, has been necessarily postponed in accordance with reasons assigned in the preceding Report of the Board. The fourth subject has been diligently worked, but it has been thought best to postpone the publication of such results as are already attained, in order that the inquiry should cover a much larger field than was at first proposed.

The fifth and sixth divisions of our plan of operations for 1869 have been fully carried out.

The following circular issued in October, 1869, has been sent to the mayor and board of health of every city, to the selectmen of every town, to every member of the legislature of 1869, and to every clergyman and physician in Massachusetts.

COMMONWEALTH OF MASSACHUSETTS.

STATE BOARD OF HEALTH,
STATE HOUSE, BOSTON, October, 1869.

To the Boards of Health of the several Cities and Towns of Massachusetts:

The undersigned have recently been appointed by the governor and council, to constitute the "State Board of Health," under an Act passed by the last legislature.

In entering upon our duties, which are rather advisory than executive, we desire to establish such communication with the local boards having this important subject in charge, that all may work together for the common advantage of the people, for the prevention of disease, and for the prolongation of life.

We believe that all citizens have an inherent right to the enjoyment of pure and uncontaminated air, and water, and soil; that this right should be regarded as belonging to the whole community; and that no one should be allowed to trespass upon it by his carelessness, or his avarice, or even by his ignorance. This right is in a great measure recognized by the State, as appears by the General Statutes.

If these were strictly and impartially enforced, we should have a condition of public cleanliness, and of public health, which would make Massachusetts a model for all other communities. That this has not been done depends upon many causes, some of general, and others of purely local operation.

It has been doubted, whether the public mind is sufficiently aware of the dangerous elements around us; whether the connection between filth and disease is as yet proved to the public satisfaction; whether the people are convinced that undrained land is unwholesome to live upon.

All these doubts of the public intelligence have impeded the operation of our laws.

It is thought also that local and private interests have often been so strong as to paralyze the action of the health authorities.

But we hope and believe that a better time is coming; and we confidently look to you to put in force the powers which the laws have placed in your hands.

Among these laws we would particularly call your attention to—

General Statutes, chapter 26, in which are comprised stringent provisions relative to the abatement of nuisances, to vaccination, to contagion, and to offensive trades.

Also, to chapter 49, section 151, relative to the sale of milk produced from cows fed upon the refuse of breweries or distilleries, and to the sale of milk rendered unwholesome by any cause.

Also, to chapter 166, in which the law is given relative to the sale of unwholesome provisions of all kinds, whether for meat or drink; the corruption of springs, wells, reservoirs, or aqueducts; the sale of dangerous drugs, and the adulteration of drugs of every sort.

It will also be seen, on reference to chapter 211 of the Acts of the year 1866, that it is in the power of any person aggrieved by the neglect of the board of health of any city or town to abate a nuisance, to appeal to the county commissioners, who can in that case exercise all the powers of the board of health.

Chapter 253 of the Acts of 1866 authorizes boards of health to seize and destroy the meat of any calf killed when less than four weeks old.

Chapter 271 of the Acts of 1866 authorizes boards of health to appoint agents, to act for them, under certain restrictions.

The legislature of 1868 passed two Acts of great importance to the public health, to which we would respectfully and earnestly ask your attention. The first, chapter 281, 1868, applies only to the city of Boston, and relates to tenement and lodging houses, placing them under very strict regulations, for the public good.

The second, chapter 160, is of general application. It provides that in any city or town, lands which are wet, rotten or spongy, or covered with stagnant water, so as to be offensive, or injurious to health, shall be deemed a nuisance, to be abated by the board of

health of such city or town. In case they refuse to act, appeal may be made, by persons aggrieved, to the superior court or any justice thereof, who may appoint three commissioners with powers equal to those possessed by boards of health.

We confidently look to you for the enforcement of these laws.

We believe that public opinion will fully support you in so doing.

We will give you all the help in our power.

There is a great work before us, which, if carried out in the letter and spirit of the laws referred to, we cannot doubt will justify the wisdom which framed them.

In making this our first communication to the boards of health of the various cities and towns of the Commonwealth, we sincerely hope that it may serve as the opening of friendly and helpful relations between us, and that it will lead to reforms, the effects of which will be evident in the improved condition of public health.

Communications addressed to our secretary, Dr. George Derby, State House, Boston, will be at once acknowledged, and will be laid before the State Board of Health at their next meeting.

Very respectfully, your obedient servants,

Henry I. Bowditch,
George Derby,
Robert T. Davis,
Richard Frothingham,
P. Emory Aldrich,
Warren Sawyer,
William C. Chapin,
State Board of Health.

Mortality in the Centres of Population.

The weekly publication of the number of deaths and of their prevailing causes in the principal cities and towns of the State was commenced in the "Boston Morning Journal" of November 3, 1869, and has been continued each Wednesday to the present time. The information contained in these reports is derived from twenty cities and towns, containing about half the population of the State. The clerks and registrars send returns to the State Board of Health, in which are specified all the deaths which have occurred in the preceding week from diseases which have any claim to be regarded as preventable, including all those which prevail as epidemics. For this purpose printed blanks are furnished.

From these materials a return in a very simple form is made for publication, showing the total mortality for the week, and *the drift of all epidemic influence.* It is hoped that these reports will be found interesting and useful, not only to physicians, but to the general public.

Although by no means as complete in their details as those ultimately furnished through the Registration Reports, they have the great advantage of referring to the present time. If small-pox, or scarlet fever, or any of the infectious epidemics prevail, the fact will be at once evident, and the danger to public health can be estimated without recourse to rumor, which in such cases always exaggerates and often unnecessarily alarms. We desire to express our cordial thanks to the clerks of the several cities and towns for their ready and hearty coöperation in the collection and transmission of these reports of mortality. The labor is a gratuitous one, often requiring attention among other pressing duties, and is undertaken solely for the public good at the request of the State Board of Health.

While the attention of the Board has been mainly directed to the subjects previously referred to, they have also had business of interest and importance brought before them by citizens in different parts of the State who were engaged in the prosecution of nuisances, or who felt aggrieved by their existence and wished our help to remove them. Among these subjects of complaint may be mentioned, to show their character and diversity :—

1st. The condition of "*lock-ups*" with reference to light and air.

2d. The pollution of streams by goat-skin factories, and tanneries.

3d. The influence of mill-ponds upon health.

4th. The building a receiving-tomb for the dead on the public highway and in the vicinity of dwelling-houses.

5th. Undrained land.

6th. Alleged nuisance from charcoal pits.

The cases as they came up have been investigated, and we have reason to believe that in some instances litigation has been prevented, and all parties made content. In others the testimony of the Secretary in cases to come before the courts has been promised. It is already quite evident that the advantage

to the public of having a central health authority to which appeal can be made in disputed points, is very great.

A case of alleged nuisance is debated in a town until everybody is enlisted on one side or the other, and it is difficult to get an unprejudiced opinion, or at any rate one which will command general confidence. In such dilemma appeal is made to the State Board of Health, who can give, as every one sees, an unbiassed opinion. Their testimony has already quietly settled several such hotly disputed questions.

We desire to call the attention of the Board to the need of an office for the transaction of business. The Sergeant-at-Arms informs us that all the rooms at the State House are already in use. A committee room has been thus far occupied for the meetings of the Board, but even this will be needed for other purposes during the session of the legislature. The business of the Secretary has, up to the present time, been carried on at his private office in his own house, as no other place was available.

In conclusion, it only remains to say that the convenience and usefulness of the Board would be promoted if the legislature should direct that in future our reports should be made returnable to the Governor, and thus appear in printed form at the meeting of the legislature in January, and that they should take their place and be numbered in the Public Document series.

Respectfully submitted.

GEORGE DERBY, M. D.,
Secretary State Board of Health.

REPORT ON SLAUGHTERING FOR BOSTON MARKET.

By the Secretary.

During the past year 53,000 beeves, 342,000 sheep and 144,000 hogs were slaughtered within six miles of Faneuil Hall. While the population within this circle of towns and cities has been every year growing more dense, requiring not only increased supplies of meat, but also, in common justice to all, increased precautions for the maintenance of health, the mode of slaughtering animals has undergone no change. The whole process is carried on in essentially the same way that it was half a century ago, when the population was not a fifth part of what it is to-day, and when the influences affecting the health of crowded communities were almost unrecognized, and quite uncared for.

The vacant and waste places where the offensive trades established themselves long ago, are now being rapidly filled by a busy population whose need of wholesome air is urgent. We have no room left for nuisances. They cannot exist in our midst without depriving somebody of what he has an inherent right to enjoy.

Practices in themselves objectionable may be permitted where there is plenty of fresh air, while in a crowded population they become offensive and dangerous. Unsewered houses, open privies, pig-pens, heaps of stable manure, may be suffered in the country, because their influence is modified by abundant ventilation; but in a crowded city, containing fifty or a hundred persons to the acre, they always increase the death-rate, and occasionally nourish a pestilence. The same considerations apply equally to the existing modes of slaughtering animals. The general welfare requires us to guard our populous towns from every form of impurity, to search out the origin of offensive, and particularly of *putrid* odors, and to show, when it is possible to do so, how they may be avoided or prevented.

Great cities everywhere are discovering that the slaughtering of animals may become a prolific and dangerous source of filth. Paris discoverd it under Napoleon the First, who applied the remedy. London was slow to reach the same conclusion, but has now followed the example of Paris. New York has recently become convinced that something should be done in the same direction, and the butchers themselves have entered upon the work of purification with zeal, and their complete success is already assured. St. Louis is now demanding a similar reform.

The great population within five miles of the State House, which really constitutes Boston, whatever may be the town and city lines, is still polluted by the foul air which proceeds from modes of slaughtering, and bone-boiling, and fat-melting, which are not only offensive, but old-fashioned, clumsy and wasteful.

The last annual report of the selectmen of the town of Brighton contains the following paragraph: "At certain seasons of the year it is almost impossible, as the slaughtering business is now managed, to prevent offensive smells, especially when found necessary to cast away the heaps of offal that have accumulated, and which, as long as left undisturbed, are prevented from emitting any disagreeable odor by the daily use of disinfectants, applied as often as fresh material is added, and where hogs are not allowed to disturb the heaps."

In 1866, when an epidemic of cholera was feared, the selectmen of Brighton employed Dr. Henry G. Clark of Boston to make a sanitary inspection of the town. His report was published, and the following extract refers to the slaughter-houses: "They all, with one exception, were in a condition and conducted in a manner which I consider both disagreeable and dangerous, directly and remotely, to their immediate vicinage, and to public and individual health. The slaughtering being done under cover, the blood, excepting what was saved in casks for sale or transportation, was suffered either to flow down through the floors into a sort of open cellar, or into the grounds immediately adjoining. The entrails and their contents were disposed of in the same way. At all of the slaughter-houses hogs were kept, and fed upon this material, reeking hot, or rotten as it might be by exposure to the sun and air, and to the wallowing of the swine in it. In some of these establishments all this filthiness was aggravated by long accumulation, and by

fermentation in stagnant pools of water. The stench about all these places so kept is horrible, and although the day of inspection was a fine dry one, with a free north-west wind blowing, the odor from some of them could be observed for more than half a mile, very strongly."

"The grounds (near points previously referred to in the report) being manured with heaps of the material, the whole neighborhood was infected with its odor." Dr. Clark also says, "Any description of the slaughter-houses must fall short of the perfectly disgusting reality, which can only be wholly appreciated by a personal inspection."

The selectmen in appealing to their townsmen to keep their slaughter-houses as clean as possible, say that "there are those who think it for their pecuniary interest to live, and compel their neighbors to live, in an atmosphere of putrid odors." Also, in another place: "The notion that one town in the vicinity of a great city can be set apart and endowed with a peculiar right to be offensive, is as contrary to common sense as it is to law. The streams which convey the decaying matter, the air which carries the sickening odors, do not stop at boundary lines—and our highways are as open, and as necessary to strangers, as to our townspeople."

This was the condition of the Brighton slaughter-houses in 1866, and they have not improved since that period. They are even more offensive now, because their number has increased, and a larger population is exposed to their influence. There are now about fifty slaughter-houses scattered through the town, none of them of great magnitude, each occupied by a single individual or firm, and each a separate centre of polluted air. The combined effect is familiar to all who pass the Allston Station, on the Albany Railroad, in the summer months, or who drive through the town by the common roads. It is perceptible on the other side of Charles River, in Cambridge, when the wind blows in that direction. *It is entirely due to putrefaction, and chiefly of animal matter.*

The great source of offence in all these establishments consists in the manner of disposing of the parts of the animal used neither for food nor in the arts. In the ox these parts are, the larger portion of the intestines and all of their contents, the "omasum" or third-stomach, the spleen, the lungs, and about

half of the blood. In the sheep, the intestines, spleen, stomach and all of the blood. Every slaughter-house has a piggery into which are thrown all these portions of the cattle and sheep. The result is a putrid mass, consisting of blood, which decomposes almost as soon as it falls upon such material, the excrement of the animals killed, and of the hogs, the half digested food contained in the entrails, and the offal itself, covered with decomposing matter. In this filth the hogs wallow. At uncertain intervals it is scraped out and banked up on the ground (often very spongy) to await a purchaser, or is carted off to be spread upon land. The track of these carts is evident on the roads, both to sight and smell. The fat is carted for long distances in various directions, a portion going to Roxbury, another to Watertown, another to Cambridge and elsewhere. The portion of the blood of cattle which does not go to the hogs is taken away for the sugar refiners, but often not until it has become disgustingly putrid.

The heads and feet are taken to the bone-boilers and glue-makers; the hides to the tanners. This general description of the disposition made of different parts of the slaughtered animals applies to all the towns about Boston where the business is carried on, except Cambridge, which city prohibits the keeping of hogs. The offal is taken from Cambridge to Lexington and elsewhere.

The floors of the slaughter-houses are of wood, and are saturated with blood. In most of them there is no sewerage; generally an imperfect drain leads to some marsh or low piece of ground; sometimes to a brook. The surrounding ground is filled with decomposing matter.

The Slaughter-House Piggeries

are objectionable on the score of health: *first*, because they produce a questionable if not positively unwholesome kind of pork; *second*, because they poison the air of their neighborhood.

The pig is almost the only quadruped feeding, in whole or in part, on flesh, which civilized man is willing to eat, unless pressed by starvation; among ourselves the only exceptions are the bear and the racoon, and meat is not the chief food of either of these animals.

The slaughter-house hog not only eats flesh, but flesh in a state of putridity, and is therefore entitled to be regarded as the *carrion beast*. If he is good to eat, so are the crow and the buzzard. Few persons would be willing to eat him if they saw him in his putrid sty, with wreaths of entrails hanging about his neck, and his body smeared with blood. We are not prepared to assert that eating pork fed in this way is productive of any special disease, parasitic or otherwise. It would be very difficult, and perhaps impossible, to prove. Butchers often say that pigs fed on beef offal make good pork, and better than pigs fed on sheep offal. However this may be, we can say with certainty that *human instinct* (which is sometimes better than reason) *recoils from such food*.

We know that the fat of the carrion beast is soft, and prone to decomposition, unless his diet is changed to grain before killing. If the question is asked of any butcher in the market whether the pork he offers for sale is from a slaughter-house pen, the reply will be such as to satisfy the inquirer that such origin is not considered a recommendation.

The second objection to slaughter-house piggeries is of a more positive character. If anything is settled as to the causes of disease it is the influence of decomposing organic matter in giving rise to diarrhœal affections, and typhoid fever, in depressing the vitality of children, thus rendering them less capable of resisting disease in every form, and in making all the epidemics more active and virulent. The slaughter-house pig-pens are filled with putrid animal matter, with rotting blood mingled with excrement, and are *therefore a source of danger to public health*.

In making this statement we do not overlook the fact that Brighton, where most of the slaughtering is done and in the manner described, has not been, up to the present time, an unhealthy town.* This apparent contradiction of a general

* The death-rate of Brighton in 1865 and 1866 was a little less than that of the whole State; in 1867 it corresponded with that of the whole State.

While these pages are passing through the press, we have learned the mortality of Brighton for 1868 and 1869, and have received an estimate of the population in those years from the Selectmen. Assuming the number of people to have increased 500 since the census of 1865, the death-rate of Brighton in 1868 was 22, and, in 1869, 27 in a thousand. These rates are as high as in the crowded wards of Boston, higher than in any one of the nineteen most populous cities and towns in the last published report, and are not equalled by any town of corresponding size in the Commonwealth.

law whose truth has been proved all over the civilized world, is capable, we think, of explanation.

The town of Brighton is three miles long and a mile and a quarter wide, and contained in 1865 less than 4,000 people. Its natural sanitary advantages are very great. Its soil is for the most part dry, its surface is broken by hills of considerable height, and it is drained on its whole northern and eastern side by Charles River. The occupations of its people oblige them to *work in the open air.* They are butchers, farmers and market-gardeners. There are no shoe factories, or other industrial establishments requiring numbers of persons of either sex to work in doors.

There is also general thrift, industry and prosperity, which, in themselves, always tend to make a people healthy. Scattered over the whole territory are about fifty slaughter-houses. It is evident, on looking at these establishments with reference to the position of the dwellings, that no one will live near a slaughter-house if he can help it.

Each slaughter-house, with its associate pigpen, is isolated, and exposed to the freest possible ventilation, both without and within. The foul air to which these places give origin is not breathed until it has freely mingled with air which is pure.

The absence of excessive mortality in Brighton up to the present time, is due, in our opinion: 1st, to the almost exclusive *out of door occupations* of its people; 2d, to its healthful site; 3d, to the separation and abundant ventilation of each of its many nuisances; and 4th, to the possession, by its people generally, of the means of procuring all the comforts of life.

The happy exemption from serious disease to which we have referred *cannot continue* if ventilation is obstructed by a dense population. As soon as people are compelled to live in large numbers in the vicinity of rotting organic matter it cannot fail to produce its legitimate and well-recognized effect.

The future character of this beautiful township, possessing rare advantages for the establishment of healthful and pleasant homes for a hundred thousand people, must depend upon the manner in which its chief business is conducted. Tainted air will finally attract a tainted population, while a reform of its slaughter-houses, which is both practicable and safe, will not

only insure the *future* health of Brighton, but greatly increase the value of its territory.

Fat-Melting and Bone-Boiling.

The fat and tallow and heads from the various slaughter-houses around Boston are carried to the melting and bone-boiling establishments. They also receive a large portion of the feet of the animals, and the fat, and odds and ends from provision stores, also very lean and unsalable meat from the markets. Some of them receive dead animals. These various portions are separated according to their fat-rendering value.

This material is carried about the neighborhood of Boston, and is finally delivered in Boston proper, in Cambridge, Charlestown, Brighton, Roxbury and other towns. Here it is boiled in open vats, and emits a most offensive odor. Sometimes an attempt is made to carry off the vapors by a high chimney, but even in this case the lids of the vats are of wood, and the foul smell freely escapes.

The effect of boiling is to drive off the watery portions, leaving in the vats tallow, lard, oil, or grease, according to the materials employed; also bones, and the scrap or "greaves."

The bones are shipped to New York or sent to East Boston to be ground and used, for the most part, as fertilizers. The scrap is generally pressed into cakes to be used for feeding hogs or poultry, and sometimes is used as manure. At one of the largest of these establishments the scrap, dipped out of the vats, is spread in layers like fish-flakes and dried by a furnace. The odor in the building where this drying process is carried on is insupportable, and the general stench from the premises is such as to be perceptible several hundred yards from the entrance. And this in a part of Boston filled with a crowded population.

Disposition made of Dead Horses, Cattle, Sheep, Pigs, Dogs and Condemned Meat.

In a population as large as that of Boston and its immediate vicinity, the amount of dead material of the description above referred to is very great, and it becomes every year more important that it should be disposed of in an orderly, cleanly and healthful manner. Dead horses from the streets and stables of Boston proper, are now carried through South Boston and

shipped from the "Point" to Spectacle Island. Fifteen to twenty a week are here boiled in open vats, emitting a horrible stench, which is carried by the wind over the inner harbor and adjacent islands. Pigs have been kept at this place in large numbers, but on a recent visit we found only two. The place is disgusting, and filthy in the extreme.

Dead cattle and sheep and pigs, from the railroad trains, are bought by the various bone-boiling establishments in the neighborhood of Boston and "rendered" in the manner described. Some of them also receive horses. Many of the animals are putrid before a bargain is made for their removal. Dogs and cats for the most part get into the docks, or are thrown into the ash carts and go to make up the filling of new land.

The Remedies

for the evils to which we have called attention, may be thus expressed in their simplest form:—

1st. The prevention of putrefaction.

2d. The conversion of the offensive vapors resulting from boiling, into inodorous and harmless gases.

Everything connected with the business of slaughtering can, in one of these two ways, be disposed of, except the manure made by the animals, which need be no more offensive than in a well-kept stable.

To accomplish all this it is necessary,—

1st. To give up the practice of feeding the offal to hogs.

2d. To build abattoirs and melting-houses within the same enclosure.

Not a single step can be made in the improvement of existing modes of slaughtering without giving up the practice of feeding the offal to hogs; with them, reform is hopeless.

It is not necessary to go to either Paris or London to see an abattoir on a very extensive plan. The "Butchers' Hide and Melting Association" of New York have one in successful operation at the foot of 44th and 45th streets, East River. They never fed the offal to hogs in the city of New York, but every other imaginable form of nuisance had grown up about the slaughter-houses which existed there five years ago. Now all is changed, and the business is conducted in an orderly, cleanly and healthful manner, giving no offence whatever to the sur-

rounding population, and as we were informed on the spot, with increased economy, profit, and satisfaction to the butchers themselves. There are twenty-nine bulks or compartments within the immense structure to which we have referred, each of which is occupied by a separate butchering firm, who have complete control of their premises. The "terms" to butchers using this abattoir or any other of the recently improved slaughter-houses in New York, are now fixed, and consist simply of *the feet and legs of the cattle from the knee down, with the skin on.* These are sold by the proprietors to the manufacturers of glue and Prussian blue for eleven cents a piece, or forty-four cents for a set of four. This pays a good profit upon investment for buildings and appliances, and all parties are satisfied.

Every portion of the animals liable to become putrid or offensive is removed before decomposition can attack it, even in the warmest weather, and this is done in an orderly and methodical way.

Melting vats are under the same roof. The vapors from these vats are condensed in the East River, and there is no offensive odor whatsoever. Nothing is wasted, and everything is made to bring the highest price by the saving of the cost of transportation. The only thing needed in this establishment to make it complete is a vat for "rendering" offal. This is now carted across the city before decomposition can attack it, to the "rendering dock" at the foot of 38th Street, North River, where is is dumped directly into vats which are then hermetically closed except for the escape of the vapors and noxious gases, which pass through coils of iron pipe intensely heated by a furnace. These vapors are finally mingled with a certain proportion of air, by an arrangement similar to an argand burner, and are conducted into the flame of the furnace where they are consumed. There are received annually in the vats of this establishment 4,000 dead horses, many hundreds of dead cattle and sheep, 5,000 dogs and cats, 125,000 pounds of condemned meat, and *those parts of the slaughtered animals which at Brighton go to the hogs*, from every slaughter-house in the city of New York.

This material is "rendered" into tallow, grease, bone and scrap, without the slightest odor proceeding from the vats

during the process. The scrap and bones are removed in barges to be used as fertilizers.

By either of these processes, the condensation of the vapors by cold water, or the destruction by fire, every tallow-rendering and bone-boiling establishment can be made perfectly inoffensive.

The Value of Blood.

The reform of any social evil may be greatly hastened if it can be shown that it does not involve pecuniary loss. Whoever attempts to reform our modes of slaughtering animals must be prepared to meet the universal statement among the butchers that hogs fed upon blood and offal are a source of profit. *We cannot deny it*, while at the same time asserting that, as a source of danger to public health, the practice ought to be given up. But we also believe that *the loss of the value of blood* involved in the present system is enough to nearly, and perhaps quite, compensate for the gain in hog keeping.*

The blood of slaughtered sheep and hogs is now entirely lost. No attempt is made to save it, and it is left to putrefy in the pens. The blood of cattle killed at Brighton is scattered over its many slaughter-houses, and is regarded as of so little value that the portion saved is sold by the butchers for anything they can get. Some of them say that they are glad to get rid of it at any price, because it so quickly becomes offensive. *The blood of Brighton does not bring to the butchers more than a cent a gallon*, reckoning one season with another. On the other hand, at the largest slaughter-house in New York, and a very fine one, although not equal to the one just described, the proprietor informed us that he sold the blood of 30,000 cattle killed last year for $5,000 cash, which was enough to pay *the interest on the cost of his establishment*, and that he expected to get a good deal more in future.

The value of blood consists chiefly in its serum or watery part which separates from the clot on coagulation; and the value of this portion depends upon its containing *albumen*. Sugar refiners use the fresh blood because it is cheaper and the color is not objectionable, but calico printers and photographers

* This gain is not as great as might at first appear, since a good deal of the offal now thrown into the pens is only partially stripped of its fat; under a better system *all* this fat would go with the tallow.

require it to be colorless and therefore use either egg albumen, or blood albumen from which the red clot has been carefully separated. From these two sources, egg and blood, comes all the albumen used in the arts. Albumen constitutes seven per cent. of the whole mass of the blood, and is readily prepared from the serum, by simple evaporation, without the addition of any other material. The process is fully described in a report made to the "Societe Industrielle" de "Mulhouse" April 28, 1869, a translation of which is furnished in the Appendix.

Solid blood albumen, the result of the evaporation, is a dry, brittle, translucent material, resembling horn, or fragments of glue. This, when dissolved in water, resumes its primitive consistence.

Blood albumen in this form is imported from France, and costs at present $1.20, gold, per pound. Our cloth printing establishments use it very extensively. It is also used by sugar refiners, and if the production should be increased, it would, for every purpose, take the place of fresh blood. At one of the largest sugar refineries in this vicinity, the supply of blood from Brighton has been found to be so uncertain and unsatisfactory (often putrid and offensive*) that the imported dry albumen has entirely taken its place. In addition to this real "blood albumen," there in another dry black material imported at a much cheaper price which is used also by the sugar refiners. This is evidently *dried blood*, with all the coloring matter retained.

Of these two articles, there passed through the Boston custom-house in 1869, 10,346 pounds of blood albumen, and 6,234 pounds of dried blood.

The amount brought into the port of New York† we have been unable to ascertain, but it was probably very much larger.

The calico printers use, it is estimated, from 8,000 to 12,000 pounds of blood albumen per annum, and the consumption for their purposes is rapidly increasing and promises to continue. If the article should be manufactured in such close connection with slaughter-houses as to preserve the clearness of color, it would

* From this cause the city of Cambridge does not permit the carts carrying blood to pass through its streets.

† Egg albumen and blood albumen are not distinguished on the books of the New York custom-house.

take the place of egg albumen for every purpose. The use for refining sugar would be very great even if the blood were simply dried, without attempting to separate the clot from the serum. These are doubtless the chief uses of blood albumen, but there are many other arts in which it is essential in small amounts. The market is extensive, the demand is increasing, and the price is such that the blood of an ox (according to French experience*) is worth $1.05 gold, when separated from its clot and coloring matter, and dried. Even with the fresh blood allowed to run into vats, as in New York, $5,000 divided among 30,000 cattle gives 16⅔ cents for each animal, which is five times as much as the Brighton butchers receive.

So much for the *serum* of blood. But there is another element of value in its *fibrine*, or the portion which coagulates, holding the red globules in its meshes.

This is a fertilizer of the most powerful kind. We have the highest chemical authority for saying that this when dried is worth more than Peruvian guano. A company is now preparing it for this purpose at the Communipaw slaughter-houses near New York, without separating the serum. It certainly is practicable to make both the serum and fibrine available. After the separation of the serum on coagulation, the clot might be mixed with dried earth or clay, or dried peat or gas lime (holding carbolic acid) or some similar material, and rapidly dried before decomposition could reach it.

We have endeavored to show that blood, under our present system (or rather want of system) is a source of filth and a source of waste—that it has a value much greater than has been generally supposed, and greater now than ever before—that the interests of health and economy combine to make it important to save it from putrefaction, and to utilize it. But this can only be done to advantage in large establishments, and by dealing with large amounts.

To complete the reform in modes of slaughtering in the vicinity of Boston in such a way that nobody shall suffer and everybody shall gain, there are needed one or more "*abattoirs*," containing all the improvements which European experience

* See Appendix.

can furnish, or modern science suggest. They need not be expensive buildings, although they should occupy a large space. They should have comfortable stables for protecting and feeding the animals. As regards the slaughter-house itself, the essential things seem to be,—

1st. A pavement of stone or of some material impervious to blood.

2d. An abundant supply of water.

3d. Complete drainage and sewerage.

4th. Vats for the "rendering" of fat and offal on the spot, before putrefaction can attack them.

5th. The means of converting blood into blood albumen.

If disinfection of "offal scrap" should be necessary at any season it could be done by means of *earth dried in the sun*, with perhaps the mixture of a little fresh lime, thus increasing its value as a fertilizer.

The *sanitary* advantages of such a system would be,—

1st. The removal of the present offensive odor, which, as population becomes more dense, must affect public health.

2d. The removal of slaughter-house pork from the markets.

3d. The ready inspection of meat, thus insuring the rejection of that which is unfit for food.

The *economical* advantages would be,—

1st. Diminished liability of having meat "spoiled" by exposure to the emanations from the putrid pigpens.

2d. The value of the blood which would be saved and utilized.

3d. The savings which must always accompany order, system, the division of labor, the avoidance of transportation, and the doing any business on a large scale.

4th. The greatly increased value of land in the vicinity of the present slaughter-houses.

The preceding considerations, together with the appended documents throwing additional light on the whole subject, are respectfully submitted to the legislature and to the people of the State, in the hope that they will hasten the day, which is sure to come, when the present offence will be removed.

APPENDIX TO REPORT ON SLAUGHTERING.

BLOOD-ALBUMEN—ITS VALUE AND MODE OF PRODUCTION.

[Translation.]

Extracts from a Report to the Chemical Committee of the "Societé Industrielle" of Mulhouse, France, by M. Charles Dollfus-Galline, April 28, 1869. (Bulletin de la Societé Industrielle de Mullhouse April et May, 1869.)

The high price now demanded for both egg and blood albumen has induced the chemical committee to examine into the causes of their enhanced value, in order that some remedy should if possible be applied, to prevent the disturbance which is threatened from this cause to the business of cloth printing. It is evident that the production of blood-albumen is not equal to the demand, especially since the English and American manufacturers have commenced making goods of a certain description ("*faux teint*") which require the use of albumen, and which until recently have been almost exclusively made in France.

We have thought that the best means to prevent this constant increase in the price of albumen would be to stimulate in every possible way the production of blood-albumen, since we believe that in many localities the blood is lost. Up to the present time Austria and France have furnished their share of the whole amount required, but Russia, North Germany, and even England, have not done their part. Your Commission believe that, in this view of the case, they cannot do a better service than to encourage the makers of albumen in all countries by explaining the process of extracting albumen from blood, a proceeding quite simple when the details are understood. In the first place we will explain the principles involved in the separation of albumen from the coloring matter of blood, and then describe the necessary apparatus and the manner of using it. Lastly we will enumerate the apparatus sufficient for the manufacture of 40 kilogrammes (88⅛ pounds) of dry blood-albumen per day.

Blood is a red, alkaline liquid, which, as every one knows, becomes a gelatinous mass by cooling soon after it has flowed from the arteries and veins. The chief constituents of blood are, water, fibrine, albumen and colored globules which, when the blood is cir-

culating, swim in the fibrine and albumen. As soon as the blood cools the fibrine coagulates, forming a kind of network which encloses the colored globules in its meshes. The more the blood cools, the more the network contracts, and pretty soon you see a clear fluid exuding from its meshes. This fluid is *serum*, and the object of the manufacturer of albumen is *to collect this clear fluid and dry it.*

The following are the means practically employed. When the animal is knocked down and his throat cut, the blood flows in a large stream, and should be received in zinc vessels of the following dimensions: Diameter, 0.38 ($14\frac{9}{10}$ inches); depth, 0.10 ($3\frac{9}{10}$ inches). These "receivers" hold about 8 litres ($1\frac{3}{4}$ gals.) of blood, and two or three must be used to obtain all the blood of an ox. As soon as the blood is received it should be taken to a place where the air is fresh as possible, but only a few yards distant from the spot where the animal is struck, and here it must remain until it has coagulated. It is important that the blood should not be carried far while it is warm, as otherwise the red globules will mix with the serum and will give it a reddish color. When the blood has coagulated, which will be in from half an hour to an hour and a half or even two hours, according to the temperature of the air, it can then be taken, without risk, a distance of several hundred yards, but this must be done in the same vessel in which it has coagulated.

When the blood has perfectly coagulated, a condition which is recognized by the gelatinous mass being covered with liquid globules almost free from color, except perhaps a light tint of greenish yellow, the clot is to be transferred to another vessel, called the "sieve." The form of this vessel is similar to the one in which the blood was originally received. The diameter, 0.38 ($14\frac{9}{10}$ inches); the depth, 0.06 ($3\frac{3}{10}$ inches); but the bottom is pierced with little holes 0.004 ^{mm} (.00015 of an inch) in diameter, with spaces between them measuring about 0.02$\frac{1}{2}$ ^{cm} (.009 of an inch). The gelatinous mass is then cut in cubes of 2 ^{cm} (0.78 of an inch) and the "sieve" is placed upon a third vessel which we call the "syphon." This third vessel is of the same dimensions as the receiver and only differs from it in having a hole in its bottom, fitted with a good sized cork. The cork is traversed by a zinc tube 0.20 ^{cm} ($7\frac{8}{10}$ inches) long, which can readily slip up and down through the cork. The object of this arrangement is to draw the fluid from the top instead of the bottom of the vessel. When the "sieve" is placed above the syphon the first drops of serum which flow are highly colored, but very soon the redness disappears and the liquid which strains through the holes of the sieve is nearly

clear. In twenty-four hours all the albumen which this operation can furnish is extracted. The clot which is left is a dark red, gelatinous solid. The serum or solution of albumen which flows through the syphon is limpid, slightly tinged with yellow. The first red drops remain in the lower part of the vessel undisturbed by the action of the zinc tube.

There are thus obtained two liquids, of which one furnishes, by drying, albumen almost colorless, the other a darker albumen, but which may also be used in the printing of the darker shades. Before removing these liquids to the drying house they should be left for twenty-four hours to settle in large vessels of earthenware furnished with a cock 15 $^{c\,m}$ ($5\frac{9}{10}$ inches) from the bottom. In this way they become clear, and furnish albumen which is quite transparent.

Such are the methods employed to produce an almost colorless albumen from blood. We believe that they are susceptible of great improvement; in fact, we are far from getting in this way all the albumen which blood contains. The analysis of M. Nasse shows us that 1,000 kilogrammes of blood contain 67 kilogrammes of albumen, while by the process we have described there are obtained only 25 kilogrammes. The following results are from experiments made upon several hundred cattle. An ox or cow furnishes an average of 18 litres ($3\frac{9}{10}$ gallons) of blood, yielding 4 litres ($\frac{88}{100}$ of a gallon) of serum. Ten litres ($2\frac{2}{10}$ gallons) of serum are required to make a kilogramme ($2\frac{2}{10}$ pounds) of dry albumen. The blood of $2\frac{1}{2}$ beeves is therefore necessary to make one kilogramme of albumen. The blood-albumen of commerce comes from cattle. We do not think that as yet the blood of sheep or of calves has been used for this purpose. The albumen of these animals has all the qualities of that from beeves. The albumen from sheep's blood is even preferable, since it thickens more.

The blood of 10 sheep, or of 17 calves, is necessary to furnish one kilogramme of dry albumen.

The serum from the blood of sheep is as rich in albumen as the blood of beeves; 10 kilogrammes of this serum furnish, by drying, one kilogramme of albumen. Calves do not give as much; 10 kilogrammes of their blood make 0.82 of a kilogramme of albumen.

We have reason to believe that the blood of pigs would give excellent results. In France their blood is too valuable to be used for extracting albumen, but in the United States, where pigs are killed in enormous numbers, their blood could be used for this purpose to advantage.

To make 40 kilogrammes of dry albumen per day (requiring the

slaughter of 100 beeves) there are required 150 "receivers," 300 "sieves," 300 "syphons," 8 large earthenware vases, and 1,100 plates, in which to dry the serum. These plates must not be too large. Those referred to are $0^m.300$ ($11\frac{8}{10}$ inches) by $0^m.250$ ($9\frac{8}{10}$ inches) and $0^m.03$ ($1\frac{1}{10}$ inches) in depth.

The following extracts from the journal of a member of the Board, written during a tour in Europe in 1867, are presented as furnishing a description of the most recent slaughtering establishments in France :—

"PARIS, Sept. 21, 1867.—We determined to visit the Abattoir of Paris, recently erected in imperial grandeur by order of Napoleon III. Never was a great idea carried out more thoroughly, and on perfectly scientific, humane and hygienic rules. It covers a space of about 150 acres, just outside of old Paris, but within the modern limits, which, like those of London, now include many smaller towns, that had grown up around the ancient *Lutetia*. It is at La Villette. There all the flesh meat eaten in Paris is slaughtered and prepared for the market. One hundred and fifty master-butchers, and nine hundred apprentices, are at work most of the time. The slaughter-houses, some thirty in number, are made of brick, with stone floors, and each is arranged with neat stables immediately adjacent, where the animals can be kept and fed. The houses are long, and two stories in height, arranged with streets, straight, broad and clean, between them, like those of a small model village. All the surroundings, as well as the interiors of the buildings, are kept scrupulously neat, and all refuse matter is immediately carried off fifteen or twenty leagues from the city by means of a canal which runs through the entire territory. In this way, and by great care, the place, instead of throwing out an offensive odor, as the establishments at Brighton, for example, are perfectly pure.

"A visitor could be in attendance all day without having his nostrils once offended, as they are always at Brighton.

"Each master-butcher can bring his animals, and on being inspected and found healthy, they can be slaughtered by him, on payment of certain charges. Inspection is made before killing, and again before the meat is carried off to market. About 2,500 oxen, 2,500 calves, and 30,000 sheep, are slaughtered every week.

"The *administration* consists of: 1st, custom-house officers for the entry of the animals; 2d, police to take care of the animals; and 3d, employés to take care of the whole establishment. Besides these there are inspectors, whose duty is to examine animals before and after killing.

"The establishment was opened January, 1867. Everything offensive is used up in a scientific way, so that everything valuable is saved, and nothing taints the air.

"An excellent oil for machinery is extracted from the feet of the sheep. The fresh blood is converted into a dry and inoffensive form of "*albumen*" used for refining sugar, and for other purposes in the arts.

"On the side of the canal opposite to that on which stands this village (so to speak) of slaughter-houses, appears a magnificent and lofty 'crystal palace' of iron and glass, intended for the keeping of large herds of cattle when first brought to be sold to the master-butchers. It is of matchless beauty because so lofty and airy-looking, and yet is admirably fitted for keeping securely in a healthy state large droves of animals.

"I think meat of animals thus kept must be more likely to be healthy than it would be after long exposure to heat or cold, and after being half trampled to death in consequence of close crowding, as in our cars from the West, and finally after being tumbled out into miserable open pens as at Brighton.

"The mode of slaughtering too is much less brutal than with us. The animals are quietly led in blindfolded, and are not aware of any trouble impending until the fatal blow is struck."

REPORT

ON THE SALE OF POISONS.

This subject appears to the State Board of Health to be worthy of renewed attention on the part of the legislature. The protection of public health from the mistakes made by those who deal in dangerous drugs seems to require additional security, if it can be accomplished without infringing upon private rights.

The Board has endeavored to collect evidence of injuries to life and health which have been caused by mistakes of druggists within a given period, but this they find impracticable. A small proportion of such cases come before the courts, or are put in such form that they can be cited as affording conclusive proof, yet it is within the knowledge of almost every citizen that such unhappy mistakes frequently occur, that they sometimes cause death, and that they often result in serious injury to health. The existing law relating to the sale of poison reads as follows:—

"If any apothecary or other person sells any arsenic, strychnine, corrosive sublimate, or prussic acid, without the written prescription of a physician, he shall keep a record of the date of such sale, the article, the amount thereof sold, and the person or persons to whom delivered; and for each neglect he shall forfeit a sum not exceeding fifty dollars. Whoever purchases deadly poisons, as aforesaid, and gives a false or fictitious name to the apothecary or other person, shall be punished by fine not exceeding fifty dollars."

This law seeks to restrain both seller and purchaser of the four dangerous articles named, but practically it is very little regarded. In our examination of the whole subject with reference to the protection of the lives of the people, we have endeavored to find all the disadvantages as well as the advan-

tages which might attend additional legislation on this important subject.

The objections to interference may be thus stated,—

1. Every one desires to buy and sell whatever he chooses with as little hindrance as possible.

2. There is a difficulty in defining poisons, in drawing a line on the one side of which shall be placed those substances which are dangerous, and on the other those which are harmless. It is often a question of quantity. Some articles in daily use will destroy life if enough be taken.

3. Some very deadly poisons are extensively used in the arts.

4. No law may be able to prevent those who desire to kill themselves from obtaining poison for the purpose, since they do not dread the evidence which post-mortem appearances may reveal. These are among the objections which may be offered to additional legislation. But we think there are considerations of greater weight which would justify the legislature in interposing their authority.

Within the past twenty years great changes have taken place both in the materials used as drugs, and in the manner of selling them. The progress of chemistry and of pharmacy has added greatly to the number of medicinal preparations. While the list of articles has at least doubled, their bulk has diminished and their power has increased. Every year adds to the number of medicines of concentrated strength, each of which if taken in small amount will kill a man, and all of which apothecaries are expected to keep ready for use. While this change has been going on, requiring increased care and knowledge on the part of those who deal with such two-edged weapons, the business of the apothecary has from various causes changed also.

People do not take as many drugs as formerly. Physicians do not prescribe such variously compounded mixtures. Twenty years ago a druggist was more exclusively devoted to his legitimate business, while now, in our large towns, he is rather a dealer in soda-water, cigars, perfumery and fancy goods.* His chief interest does not, in many cases at least,

* The following advertisement is taken from a Boston newspaper of Dec. 21, 1869:—

For Sale.—The well-known Drug Store at the junction of Court and Hanover Streets. This is a splendid opportunity for one or two live men to secure the most

correspond with his duty to the community as a dealer in articles which, through a want of prudence or knowledge on the part of himself or his assistants, may carry death into any family.

The most poisonous preparations may be often found in druggist stores in dangerous proximity to articles in daily use, and both are liable to be dispensed by boys who are completely ignorant of their properties.

Our best apothecaries lament this condition of the business to which their lives are devoted. They know that their position is one of responsibility, entitled to the honor and confidence of the community, but in spite of their efforts they find themselves more or less involved in the discredit which has fallen upon their vocation. They are ready to welcome any change whose effect will be to "magnify their office."

In seeking for a remedy through legislation for the evils to which we have referred, it seems to us that although the present law relative to the sale of poisons is of little value for the protection of the health and lives of the citizens, it would nevertheless be useless to multiply restrictions upon the sale of individual articles. It is doubtful whether a list *could* be prepared which would include all dangerous drugs. We think, moreover it would be unwise, to restrict either the physician, or the dealer exclusively by wholesale, in any way. But as regards the retailer of drugs and medicines we believe a remedy more or less complete for existing evils would be found in the requirement of *a certain amount of instruction and special training before he should be permitted to exercise his calling*. The precise way in which this should be accomplished seems of less importance than that the principle should be established that a business of such usefulness and responsibility, as well as of such danger, to the public health, should be both protected and honored. We respectfully commend this subject to the attention of the legislature.

Every year lives are lost by people taking the wrong medicine. Some of these lives we think might be saved by requiring apothecaries to distinguish between medicines for external

profitable store in the State. A knowledge of the drug business not necessary, as the trade is principally fancy goods, patent medicines, cigars and soda-water. Profits on soda sales alone more than pay the running expenses. Apply at the store between 2 and 6 P.M.

and internal use by putting them in bottles of a different shape or with labels of a different color. Very dangerous drugs might be marked, as they are in France, with a skull and crossbones, or the word "poison" be placed above the number of the recipe or the druggist's name.

In considering the various dangers to which public health is exposed from the use of poisonous drugs, it should also be said that physicians are often blameworthy through the obscurity of their prescriptions,—written for the most part in abbreviated Latin, often in haste, by imperfect light, and upon any accessible scrap of paper, they may sometimes puzzle the most skilful druggist. Legislation cannot directly remedy this evil, but we believe that if the education of the physician and the druggist were brought under the same general supervision, each would better understand the other, and both would more intelligently coöperate for the relief of human suffering.

THE PREVENTION OF DISEASE.

By GEORGE DERBY, M. D.,

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[The following observations include some remarks made at a meeting of the Boston Social Science Association, Dec. 3, 1868. They appear in this form at the request of the State Board of Health.]

Are diseases preventable? Are their causes so far understood that we are justified in saying that they may be avoided? Or are they mysterious, a part of the plan of creation, and not to be averted by human foresight?

The history of medicine shows that until recent times the most destructive diseases have been practically regarded as quite beyond the power of man to prevent. Plague and pestilence have been thought to be providential, and only to be averted by the prayers of the church. It is true that the great fathers of medicine left behind them rules for the maintenance of health which have had a certain currency in the world. They were but glimpses of what is now known as sanitary economy, but not being founded upon demonstrable truth, they fell to the ground.

In the oscillations of medical opinion at the present time, the pendulum swings, first in one direction and then in the other, over the immutable truths of physical, chemical and pathological science, each day bringing us nearer to a just appreciation of the wonderful processes which give rise to the various phenomena of health and disease.

Now, the brilliant generalizations of some chemical philosopher almost lead us to believe that the mysteries of vital action are revealed through the laboratory; or even by the microscope we seem to be peering into the human laboratory itself, and

reading, as in an open book, secrets which have been concealed since the creation. But patient and careful students of disease follow up these revelations, and clearly show that so complex a machine as the human body cannot yet be regarded as a piece of inanimate material. Meanwhile, the sum of clear and connected and practical knowledge of vital processes is constantly and rapidly increasing.

In the prevailing discredit of drugs as weapons for attacking and driving out disease, there are wise and good men whose enthusiasm in the idea of the self-limited and inevitable character of the most destructive diseases, when once established, leads to the encouragement of a kind of fatalism. They would persuade us that the causes of epidemics are unknown, that contention with them is vain, and that the best we can do is to prepare for an easy death by cholera, or fever, or whatever else Providence may send, and be thankful it is no worse.

It is almost a repetition of the dogma of necessity and predestination, so familiar to our fathers. But there is another side to the question. Freewill is as applicable to the physical as the moral man. We have only to open our eyes to the demonstrations of these latter days to be assured that immunity from some of the most destructive diseases is within our power; not perhaps within our individual power, but that they are capable of control, limitation, extinction even, by associated effort.

Such demonstrations as those to which we have referred were not possible until the system of registration of population and of mortal diseases became a part of the established law of civilized communities. Political economists and statesmen had seen the waste of life, and philanthropists had seen the suffering, but in the absence of vital statistics no one could prove what many intelligent minds perceived. At the present day we stand face to face with facts of the deepest interest, showing the comparative duration of life in different communities, the causes of deaths, the influences of soil, of climate, of race, of inheritance, of occupation, of contagion, of putridity.

Hand in hand with these significant facts the sciences advance. Tyndall, and Liebig, and Haughton, and Pasteur, and Jeffries Wyman, and a host of earnest seekers after truth, wherever it may lead, carry forward, day by day, the actual

boundaries of pure and exact science; till we seem to be entering on a field of knowledge which Benjamin Franklin may have dreamed of, but certainly never described, in his various foreshadowings of the possibilities of the future.

And what are these demonstrations with regard to disease which it concerns us to know? They are the putting together, in the relation of cause and effect, of certain established facts,—*the conditions under which people live, and the diseases associated with such conditions.*

It has been the reproach of medicine that it is inexact; that its rules of practice are conflicting; that doctors disagree. This may be accounted for by the intricacy of the problems they are called upon to solve, by the complexity of the human mechanism. This uncertainty diminishes as science advances; but it may be claimed to-day, for one of the departments of medicine, *public hygiene*, or, as it is sometimes called, the *medicine of the State*, that by the grouping together of great numbers of cases, by which process errors are extinguished and the truth made manifest, we are brought in such relations with disease that its teachings are almost entitled to be regarded as fixed, conclusive, final and exact.

Look, for instance, at the connection between typhus and typhoid fever, and the decomposition of organic substances. One of the accepted modern names for this disease is pythogenic fever, or fever born of putridity—this being its distinctly proved external cause. That an obscure internal cause, which in our real ignorance of its nature is called a proneness or disposition to receive the poison, is necessary for its development, does not affect the truth of the fact that without filth the disease is not born. The evidence connecting this disease and all its kindred with uncleanness and putridity, decomposing matter, and particularly the excrement of the bodies of men and animals, conveyed to the human system by air and by water, is given in great detail in the English government reports of the past fifteen years, and cannot fail to convince any one who will examine them without prejudice. The whole train of so-called zymotic diseases, or diseases whose course suggests the idea of a morbid ferment, are of the same class.

The plagues and pestilences of the middle ages, which sometimes swept away one-third of the inhabitants of Europe, are

examples of the virulence of such diseases when people were huddled together in great towns, without drains or sewers, or any provision for the removal of human excrement and the foul matters which proceed from the various processes of society. As civilization advanced these pests declined; but even as late as the days of Hogarth, who has made us familiar with the foul appearance of the streets of London in his time, the rate of mortality is known, from the history of the Tontine insurance scheme, to have been vastly greater than at the present day. We are now able, through the registration reports, to mark with perfect accuracy the improvement in the duration of life through Great Britain. As improved works of sewerage and water supply go into operation in certain districts, the death-rate falls. As the foul alleys of Liverpool are cleared up, and the poor who had lived in cellars are brought to the light of day, the death-rate falls. And so it is everywhere. The improvement of public health, as expressed by that unerring guide, the death-rate, corresponds with all the means by which air and water are kept free from pollution.

If there is any one disease which more than another would seem to favor the views of the advocates of the predestined and the inevitable, it is that terrible scourge, far more to be dreaded than cholera, *consumption*. It has been regarded as a special mode intended by Providence, to reduce a redundant population, as feeble trees in a forest are crowded out of existence by their more vigorous neighbors. And there is much in the history of the disease which makes such arguments plausible. It is found everywhere in civilized communities,—in the South as well as the North,—seeming to be generally distributed. Yet the kind of investigation of its natural history and of its causes which we are able to make in these latter days, through the aid of vital statistics, and by the comparison of great numbers of cases, shows that this is far from being true, and places us directly upon the path leading to a discovery of the conditions under which it originates, conditions which, when fully recognized, may be avoided. That its causes are many is certain; that some of them are obscure, and even quite unknown as yet, is very probable. But others are fully revealed, and are influencing practice and saving life. One of them is thus stated by Mr. Simon, medical officer of the English Privy Council,

and is abundantly proved by him. "In proportion as the people of a district are attracted to any collective in-door occupation, in such proportion, other things being equal, the district death-rate by lung diseases will be increased."

An examination of the deaths from consumption in Massachusetts * during ten years (45,000 cases) shows that its distribution in the various towns is very unequal, in some of them the mortality from this disease being two and even three times the number found in others of equal size, and equally stationary population, representing all ages.

Dr. Bowditch, of Boston, has clearly shown that among the prominent causes of consumption is exposure to *soil moisture*. This conclusion is derived from a careful comparison of statistics furnished by physicians in all parts of Massachusetts, and is a result of such comparison exclusively. There were no preconceived ideas, and no previous suspicion was entertained of the existence of any such law. A singular confirmation of its correctness has recently come from England. In 1865 and 1866, inquiries were made, under government authority, into the effect of drainage works and other sanitary regulations designed to promote the public health. In pursuance of this inquiry, twenty-four towns were selected in which improved drainage had been established. It appeared that, while the general death-rate had greatly diminished, it was most strikingly evident in the smaller number of deaths from consumption. In commenting upon this fact, the chief medical officer reports that "the novel and most important conclusion suggests itself that the drying of soil, which has in most cases accompanied the laying of main sewers in the improved towns, has led to the diminution, more or less considerable, of phthisis."

It has since appeared that the English physicians were entirely ignorant of the observations previously made on this side of the water by Dr. Bowditch, to whom of course the credit belongs of first disclosing this hidden source of danger.

These are the kind of discoveries which advance rational medicine, and prolong life. Not evolved from anybody's internal consciousness, which is good for nothing in the healing art, but deduced from observation. We do not readily see at the

* Massachusetts Registration Report, 1865.

first glance how immensely important they are, nor do we always note, in the constant fresh recognition of the causes of disease, and the means of their prevention, our real rate of progress.

Everybody sees to-day, that of two families inheriting a consumptive tendency, if one takes to making shoes in an ill-ventilated shop, and the other goes a lumbering in Wisconsin, the latter will live the longest. But our grandfathers did not know even that. They protected such persons from fresh air, fearing they would take cold, coddled them, nourished them imperfectly, and gave them medicine.

In the light of Dr. Bowditch's new law we now know in addition that they must not live on wet soil.

There is much in the records of consumption in Massachusetts during the past few years to encourage the hope that private and public hygiene are already anticipating and averting its ravages. The following table will make the gratifying fact apparent, that consumption is really diminishing in fatality. It well illustrates the value of vital statistics, since without their aid it could not be proved.

The population for each year is derived from a table published in the report of the census for 1865, and is based upon the ratio of increase found to prevail in each period of five years.

Mortality from Consumption in Massachusetts in each of the past sixteen years.

YEARS.	Population.	No. of Deaths from Consumption.	Deaths from Consumption to each 100,000 living.
1853, . . .	1,075,007	4,593	427
1854, . . .	1,103,351	4,611	418
1855, . . .	1,132,364	4,750	419
1856, . . .	1,151,455	4,701	408
1857, . . .	1,170,862	4,625	395
1858, . . .	1,190,592	4,574	384
1859, . . .	1,210,656	4,704	388
1860, . . .	1,231,066	4,557	370
1861, . . .	1,238,110	4,522	365
1862, . . .	1,245,310	4,269	343
1863, . . .	1,252,500	4,667	372
1864, . . .	1,259,710	4,733	376
1865, . . .	1,267,031	4,661	368
1866, . . .	1,274,310	4,600	361
1867, . . .	1,281,700	4,362	340
1868, . . .	1,289,200	4,437	344

A comparison of the first two columns shows at a glance that the number of deaths does not increase with the population; and in the third column, representing the mortality to a fixed number of the people, the constant improvement is plainly seen,—not always from one year to the next, but perfectly evident when two or three years are taken together.

Comparing the first group of five years with the last group of five years, it is seen that the annual gain in each 100,000 of the population is 54 lives; this gives, as the actual saving of life in the last five years, 3,440 persons, or 688 in each year. From some cause, or combination of causes, deaths from consumption in Massachusetts have diminished by that amount, and the improvement seems to be still going on. It is of the utmost importance to discover what these causes are; but here statistics fail us, and we are left to conjecture. Our own belief is, that they are to be found in *the advance of medical science*, which has given to physicians a better knowledge of the nature of the disease, derived from pathology; a better mode of treatment, derived from the careful observation of cases, and from modern discoveries in chemistry and physiology; and a greatly improved acquaintance with the means by which consumption may be avoided by those predisposed to it by inheritance, derived from all these sources combined.

This knowledge is becoming diffused among the people, so that all intelligent persons now know more about the prevention of consumption than the wisest physicians knew fifty years ago.

Fresh air, by day and by night, strong and nourishing food, dry soil on which to live, sunlight and warm clothing, are the means of saving many lives which would have been hopelessly lost in the preceding generation. If our conjectures are correct, this improvement may be expected to continue, and everybody can help to make it greater. Ventilate the schoolrooms and the workshops and the stores and the houses. In cold weather let the air, comfortably and equally warmed, be generally supplied from without in a constantly flowing current. Let those who can provide it in their homes remember that an open fire, which sends two-thirds of the heat up the chimney, furnishes the best ventilation for a room of moderate size which the ingenuity of man has yet devised, and that the heat

escaping by the flue is the price to be paid for it. Let in the sunlight, and never mind the carpets; better they should fade than the health of the family. When a man proposes to build a dwelling in a swamp, warn him of his danger.

Let us look at another class of diseases: scarlet fever, measles, small-pox and kindred eruptive fevers; syphilis, also, which under various disguises is always making terrible havoc, and by no means only among the vicious. All these destroyers of life are propagated by *contagion*. In view of this fact it has been proposed that they should be *stamped out*, extinguished, made an end of.

Such a proposal looks visionary. It is certainly impracticable at the present time, and yet is perfectly consistent with what we know of the manner in which these diseases are propagated.

Look at the following facts, derived from the English registration reports, and see if this is not so:—

In one of the Faroe Islands, a remote place, rarely visited by strangers, but containing 7,782 inhabitants, there had been no measles for sixty-five years. In 1846 it was imported by a sick sailor, and 6,000 of the people took the disease.

In the Scilly Islands, with an average mortality from other diseases, no death occurred from either small-pox, measles or scarlet fever for ten years, 1851 to 1860. In both these instances the sole exciting cause, *contagion*, was wanting for long periods.

We have now referred to three groups of diseases which, combined, are responsible for at least half of the annual deaths in this community.

First. Typhoid fever, taken as a type of the zymotics, with whom its connection is more or less intimate; born of impurity, of the decomposition of organized substances.

Second. Consumption, or that depraved condition of the body which is marked by tubercular deposit in the lungs,—a disease having for two of its recognized causes, first, "collective in-door occupations," which may be regarded as almost synonymous with the habitual inhalation of air rendered foul by respiration; and, second, *soil moisture*. The third group has for its exciting cause *contagion*, and that alone.

If these things are so, the prevention of the special excitant of these conditions will prevent the special mode of death or

the contraction of the special disease, connected with it by the inexorable law of cause and effect, and this is proved by experience. In the great lying-in hospital of Dublin, during twenty-five years before ventilation was introduced, the mortality of new-born infants in the first two or three weeks of life was one in six. In the twenty-five years following the introduction of good air, the mortality was one in one hundred and four. In Liverpool, before the city was purified and people compelled to live above ground, the annual death-rate was 38 in 1,000; after these measures, 24 in 1,000.

In the group of English towns before referred to, after the establishment of drainage, the deaths diminished.

In our army during the recent war, military necessity sometimes required that ground which had been occupied by the enemy should be occupied by our troops. If this ground was scored with trenches, and percolated with the liquid waste and refuse of the camp, it always caused fever and diarrhœa, and these diseases were either entirely removed or diminished by changing camp to fresh ground.

The epidemic of fever at the Maplewood Institute in Pittsfield a few years ago, was caused by an accumulation of filth, and ceased on removal of the cause.

Instances of this sort, where the cause has been sought for and found, and the epidemic thereby stayed, are so numerous that we need not cite them.

The special danger in a battle is the being hit with bullets; yet a majority of those exposed escape, and so it often is with those exposed to the less evident dangers of air rendered unfit for breathing by being charged with putridity, or the dwelling upon undrained soil, or direct contact with virulent contagious poisons. In all these cases, the true relation of cause and effect, which would frequently elude us in the individual, becomes evident in the comparison of great numbers. We often, for instance, hear it said by persons in apparently sound health, that the conditions under which they live must be good and healthful, because they do not suffer. Much self-deception is practised in this way. Unwholesome influences may for a long time be resisted by a vigorous constitution; yet the time at last arrives when they show their power. In such cases, we may often observe the effects upon children when they are not evi-

dent in the parents. In fact, it may be taken as a rule that the condition of the young children is a sensitive gauge of the sanitary influences of a district or neighborhood.

The prevention of disease may be considered,—

First, as regards the individual, or family, or household; and second, as regards the community at large.

What power have we to ward off disease from our own homes? There are certain dangers to which we are exposed which a prudent head of a family may constantly bear in mind. One of these, and by far the most important, is from insufficient ventilation. Every man, woman and child is entitled to their full ration of fresh air—to that amount which will both dilute and quickly remove all which has been spoiled by respiration and combustion, and by the mixture of dead organic particles, which the lungs and skin are constantly throwing off. This organic matter is our deadly foe, since it quickly undergoes decomposition. This we may perceive when, coming from the outer air, with our sense of smell unblunted, we enter a small bed-room which has been closed and occupied during the night. But this is not all the mischief which it does. Our houses are strewn with dead organic matter in invisible particles, and upon such particles the action of decomposition is readily set up by the effete matter discharged from our bodies, as fermentation is excited by the yeast plant, and by the same process.

Fresh air is the great natural disinfectant, antiseptic and purifier, and not to be compared for a moment with any of artificial contrivance. There is plenty of it in the world, yet, disguise the fact as we may, there is no getting over the unwelcome truth, that to provide it in abundance in our climate is expensive, since during seven months of the year it must be artificially warmed. To take in air at the average winter temperature of 28°, raise it to 68°, and discharge it again from our houses even once in an hour, is a process which cannot be accomplished without paying roundly, yet on no other condition can we reasonably expect health and long life. The best way is to freely admit that it is expensive, but worth the money it costs. If Benjamin Franklin thought that "a penny saved is a penny earned," he was also equally sure that "health is wealth." Instead of asking ourselves with how little fuel can I warm my house, by stopping the flues and the beneficent window-cracks

which the carpenters have left, the question should be, how much can I *afford to pay* for fresh supplies of pure air, moderately and equally warmed and distributed without waste. I cannot help believing that the sum of family health and happiness in a generation would be more increased by liberal expenditures for this purpose than for any other. But even if we are willing to pay for it, efficient and equal ventilation is not always to be had, and here the builders and architects are to a great degree responsible.

It is not altogether surprising that this should be the case. Architecture was a full-grown art two thousand years ago. Ventilation is modern. It is only a century since oxygen was discovered. Fifty years ago the physiology of respiration was not understood. The agency of foul and putrid air, air filled with decomposing organic material, in causing disease, is a very recent discovery; yet nothing is better established.

To get rid of this poisonous air, and to supply its place with air which is fit for respiration in all weather in our variable climate, and to do this without offensive and dangerous draughts, or excessive heat, is a problem of great difficulty. Its solution does not properly belong to the medical profession, but needs the highest skill of civil engineers and architects. It is very certain that none of the modes of heating and ventilating now in use can be regarded as automatic. They will not run of themselves for six consecutive hours from November to May, and they need the constant care of an intelligent person. The head of a family who takes this responsibility upon himself will be repaid for his time and trouble in the health of his household.

We cannot leave this all important subject of ventilation without referring to the insensibility to foul air which proceeds from its habitual inhalation. Pure air is admitted by all intelligent persons to be an excellent, a most important, even an essential thing to have in the house, yet we are sure it very often happens that those who so declare their convictions constantly feed their lungs upon air loaded with impurity, and are quite unconscious of it. For this reason, and to avoid the use of words which do not convince if the senses are blunted, we can conceive of no greater addition to human health and happiness than would be afforded by the invention of some instrument, simple in construction, like the thermometer, barometer or hygrometer,

which could measure and mark the purity of air, and its fitness for respiration.

Another source of danger in our houses, similar to that which we have just referred to, yet seeming to require special mention, is from the retention of decomposing materials in furniture. Dining-room carpets receive a great deal in the debris of food. It is carried about in the air, and, in combination with vapor, attaches itself to woollen and cotton textures of every kind, to paper-hangings, to whatever will absorb moisture. A house whose entry smells musty is dangerous. Avoid it. Don't live in it. Keep the children out of it.

Another danger is in a damp cellar. Its atmosphere goes all over the house in spite of every effort to prevent it. It is very common with us in crowded cities to occupy a portion of the house beneath the surface of the ground, either for kitchen, office or dining-room. It is a custom which only necessity can excuse, and on the score of health cannot be justified. Who would be willing to sleep in such a room if he could sleep anywhere else?

A prudent householder will look closely to the condition of his drains. If they are leaky or obstructed, the health of the family will surely suffer; but there is another danger, less obvious, which should be borne in mind. Modern houses are built with water-closets, and set wash-stands on every story. Each of them is in almost direct communication with the air contained in the main sewers of the city; these sewers are open where they empty into the harbor, and exposed to the full force of the wind at certain states of the tide. Our only defence is in the little traps beneath our household conveniences. These are liable to break, to corrode, to wear out; in which case the deadly gases of the sewers may escape in the very rooms in which we sleep.

Most houses in the country are exposed to special dangers from the absence of drains; the refuse from houses being poured upon the ground, thereby infecting not only air, but water also. In some instances the kitchen slops, delivered from a spout upon a limited space, have in the course of time worn a direct channel to the family well. In any case, it may be useful to remember that the soil surrounding a well is drained by it,

and that the extent of this drainage may be represented by an inverted cone, of which the base, at the surface of the ground, is equal to from one to three times the depth of the excavation, this difference depending on the porousness of the earth. In this view it will be seen how important it is for the purity of both air and water that pigsties, privies and manure-heaps should be kept at a certain distance from the dwelling. Many a case of typhoid, and much impaired vitality, ready to succumb to trifling ailments, might be traced to such pollutions. The disinfecting quality of earth itself fortunately relieves us from the greatest liability to impure well-water, but even this beneficent quality may be exhausted by abuse. We may, in this connection, refer to the remarkable purifying property of earth in other most valuable applications which may be made of it.

The Indians are said to have taught us the fact, that the fetor of the skunk can be removed from clothing by burying it in the earth. Dogs are believed to render putrid meat and bones more palatable by the same process. It has long been known that soils absorb the volatile matters which give the sensation of odors; but, only recently has it been found out, that the process of *drying* earth increases its disinfecting power in an astonishing degree.

Like some other valuable discoveries, it seems surprising that nobody thought of it, or applied it before. But the simple fact is, that the privy may be made as inoffensive as the corn-barn, by the application of about a pint and a half of *dry earth every time it is used.*

There is no need of chloride of lime, or copperas, or carbolic acid, or any other chemical, not readily procured, but *simple earth*, of which there is everywhere (in the country, at least) an abundance, is all-sufficient for the work, and may afterwards be returned to the fields from whence it came, with its value for agricultural purposes greatly increased.

There are one or two things about it important to remember:

1st. It should be *earth* (not sand or gravel), and be thoroughly dried, either by exposure to the sun, on shelves, or in some other equally effective way. Fine coal-dust will do, but is not as good as earth, either for disinfection or for the land.

2d. The privy-vault must be kept free from rain, from slops, and from excessive moisture of any sort. The more fluid is thrown in, the more dry earth will be needed to absorb it.

How often it happens that a country hotel or boarding-house, crowded with people, becomes, late in the season, disgusting and unhealthy from causes which we have referred. A few shovels-full of dried earth thrown into the privy, once a day, will remove all offence.

The prevention of disease in the community at large, by the authority of towns, cities and State, has always been practised to a certain limited extent, but, whenever public opinion shall authorize, it can be greatly extended. The drainage and water supply * of crowded communities is still insufficient; the erection of buildings for lodging the poor and improvident classes, having every provocation for disease in their arrangements, is freely allowed. The removal of putrefying material from among the living is too often neglected. Narrow and unventilated streets, in crowded towns, are permitted to increase the death-rate of their inhabitants.

The preservation of the health of communities is beginning now to attract the attention which it deserves, although it is, as yet, but imperfectly perceived, either by the medical profession, or the public at large. It was well said, some years ago, by one whom we all venerate, and who was then in advance of his time, that in certain diseases, as typhoid fever, the duty of the physician was like that of the sea-captain in charge of a ship in a gale of wind. He is as utterly powerless to expel the disease as the seaman to control the winds and the waves. Yet both can so manage their charge, that the best possible opportunity shall be given for surviving the tempest. The truth of this comparison is generally admitted by physicians at the present day.

But suppose the public hygienist can point out whence these storms arise, and what are the laws governing their development; can reach to the half hidden, but definite causes of these perturbations, and distinctly show that they may be suppressed in their origin, that they may be *prevented*, may he

* The *quality* of water to be brought from a distance to towns and cities should be closely examined. It is not enough to know that it is *now* pure, but those who are to use it should control all sources of future pollution. Organic impurity we have most to dread, but it should also be free from the salts which make water *hard*. It should dissolve soap readily.

not be said to control the winds and the waves, and is not his office one of incalculable dignity and value?

We are all aware of the disposition to exaggeration and over-statement which attends the consideration of such matters, but it is fair to say that the subject itself is vast, that it broadens and deepens as it is contemplated. Take the extreme case of the health of great communities three hundred years ago, and to-day:—The plagues of London before its purification by the great fire, and its death-rate in 1866. Liverpool twenty years ago, and Liverpool to-day. The group of great English towns which have been drained and cleaned within the last twenty-five years, and the improvement in the duration of life coincident with these changes. The small mortality in the clean and well-kept houses built by Mr. Peabody, for the poor in London. The diminished mortality in the city of New York, immediately following the measures so efficiently carried out by the Metropolitan Board of Health, a diminution most marked in the wards which had previously been most filthy and most unhealthy.

Now, let us ask ourselves what would be the effect upon the annual mortality in a community like Boston if the wretched cellars, and crystal palaces, and rookeries, and dens, in which the extremely poor and improvident live, could be depopulated, and their occupants transferred to well drained and lighted and ventilated buildings, of however cheap and simple construction; if all the foul fluids could be made to quickly depart, by force of gravity, through ventilated sewers; if all the foul solids could be removed without delay in carts provided with the means of arresting putrefaction; if the blind alleys and narrow streets were opened to the circulation of air, and the admission of sunlight; if the old vaults were removed, the old cisterns torn down or filled up, and the general principle of *cleanliness, in its broadest sense*, applied to air, water and food?

All these reforms are practicable whenever public opinion recognizes their expediency, and gives the necessary authority for their execution. It is for us to aid in bringing the people up to that point, when, for the general welfare, all will be willing to assist in the good work of sanitary improvement, even at the occasional temporary sacrifice of personal convenience and profit. In such a cause no selfish considerations need be

appealed to, yet it may be useful to remember that we cannot escape the sanitary influences of the community in which we live. A poison may be generated in another street, which will originate disease, or add virulence to the type of one already existing, and which may then overleap all barriers erected about our own dwellings, and strike down those who may be living in fancied security. *Our own immunity from disease cannot be secured without looking after the safety of our less prosperous neighbors.*

We cannot refrain from expressing our belief that the time is not very distant when those having the public health in charge will be held responsible for damages caused by the outbreak of preventable diseases, when the means of prevention have been neglected, as the authorities are now made responsible for broken limbs by reason of defects in the public highway.

EXPENSES

Of State Board of Health to December 31, 1869

Salary of Secretary from Sept. 22 to Dec. 31, 1869,	$68
Travelling expenses of Secretary,	3
Postages,	15
Express agents,	
Paid by Dr. Bowditch for special investigations concerning tenement and model houses,	10
Wright & Potter (printing),	10
J. L. Fairbanks & Co. (stationery),	3
E. M. Sawyer (copying),	2
Personal expenses of members of the Board while engaged in its duties,	2
Miscellaneous expenses,	
	$1,16

SENATE..... .....No. 50.

SECOND ANNUAL REPORT

OF THE

STATE BOARD OF HEALTH

OF

MASSACHUSETTS

JANUARY, 1871.

THE PROPERTY OF THE WORK HOSPITAL

BOSTON:
WRIGHT & POTTER, STATE PRINTERS,
79 MILK STREET (CORNER OF FEDERAL).
1871.

MEMBERS OF THE BOARD.

H. I. BOWDITCH of Boston, *Chairman.*

R. T. DAVIS of Fall River.

P. EMORY ALDRICH of Worcester.

W. C. CHAPIN of Lawrence.

WARREN SAWYER of Boston.

RICHARD FROTHINGHAM of Charlestown.

GEORGE DERBY of Boston, *Secretary.*

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ERRATA.

In Typhoid table, pages 114 and 115:
Opposite Adams, for 7,475, read 747.
" Fall River, for 17,451, read 17,481.
" Montgomery, for 853, read 353; for 948, read 392.

Commonwealth of Massachusetts.

BOSTON, Jan. 21, 1871.

Hon. HORACE H. COOLIDGE, *President of the Senate of Massachusetts:*

SIR,—I have the honor to present to the Legislature the Second Annual Report of the Massachusetts State Board of Health.

Very respectfully,
Your obedient servant,

GEORGE DERBY,
Secretary of the State Board of Health.

GENERAL REPORT OF THE BOARD.

To the Honorable the Senate and the House of Representatives of Massachusetts:

The State Board of Health, in presenting to the General Court its Second Annual Report, desires to acknowledge the courtesy and cordial reception it has met with from the civil authorities, and from the local boards of health of the towns of the Commonwealth. At the suggestion of this Board,* correspondents have been appointed by the authorities in various towns. These correspondents form an efficient body of aids. Their letters and other labors, some of which will be presented in this Report, have already added immensely to the power for really good sanitary work, which, through the liberality of the legislature, the Board has enjoyed. It is our hope that this corre-

* The following circular was sent to every town in January, 1870:—

[CIRCULAR.]

To the Board of Health of the of

GENTLEMEN,—The State Board of Health is desirous of establishing such communication with every city and town in Massachusetts that they may be able to investigate the causes of disease and death. They believe such causes to be often obscure when examined in detail, but that when grouped and classified in large numbers they sometimes reveal the existence of influences which have an important bearing upon public health, and the prevention of disease.

They would like to have a medical correspondent in every town, to whom they could apply for local information — some physician possessing your confidence, and who would be willing for the public good, to report to us facts relating to disease occurring within your jurisdiction.

Will you have the kindness to send us the name of some one physician, upon whose information we may rely, and who will be willing to perform the service to which we have referred?

In behalf of the State Board of Health,

Very respectfully yours,

GEORGE DERBY,
Secretary State Board of Health.

spondence and these labors will annually become more valuable contributions to scientific medicine and, at the same time, that they will tend to give more knowledge of sanitary matters to every citizen who wishes to educate his family to perfect health.

Legislative Results of Last Year's Labors.

Among the most agreeable results of the labors of the Board last year was the passage, by the legislature, of an Act of incorporation to enable certain persons to build an abattoir at Brighton. The same Act imposed upon the Board very important duties in reference to the building itself and to the establishment of sanitary rules upon which it was to be subsequently managed. We hailed this Act as one destined to bring great benefit to the comfort, health, and, we may add, to the wealth of Brighton. We regret to say that, as yet, no practical result has come from the Act, owing, as we have good reason for believing, to the persistent opposition of the butchers of that town. The Board desires to bring the subject again earnestly before the legislature and whole community, as well as before the citizens of Brighton.

We are informed that indictments are now pending against three or four slaughter-houses in Brighton as nuisances to the immediate neighborhood.

We may also remark that the building of an abattoir, with its thorough sanitary rules, is quite as important to the community at large, consumers of the meat slaughtered at Brighton, as to the inhabitants of that town. The Commissioners on Cattle have already ordered that no cattle shall be carried from Brighton. Many affected with the "foot and mouth disease" are liable to be slaughtered at private establishments, in different parts of the State and the meat then sent to the consumers, and eaten. This cannot be prevented until proper inspection before the killing of the animals can be enforced, as is now done in all the regularly constituted abattoirs of Europe.

In order to aid still further a true appreciation of the importance of this subject, we recommend the perusal of two reports presented this year, viz.: that upon the "Health of Towns" and that upon "Typhoid Fever in Massachusetts." In these reports, besides an immense mass of evidence going to prove the deleterious results arising from the decomposition of animal

refuse, some of our correspondents allude especially to the bad effects caused by proximity to slaughter-houses.

The Foot and Mouth Disease in Cattle. — Its Effects on Man.

This subject, save in its immediate relation to man, has been examined by another board (Commissioners on the Cattle Disease), and efficient action has been taken thereupon. The disease has been prevalent for some time in New England. Every one naturally feels desirous of knowing what, if any, would be the effects of the use of milk from diseased cows, or from the eating of flesh of diseased cattle. The Board has had no opportunity to thoroughly investigate this subject in this State, although attention has been given to it during the past few weeks. Meanwhile we feel that it may be well to give a brief abstract of the results of English investigations.

It appears that, in consequence of the extensive prevalence of the disease, during the autumn of 1869, in various parts of England, the Privy Council determined to make a special examination of the question as to "the effects produced on the human subject by the use of milk derived from animals suffering" from this disease.

Dr. Thorne, the special investigator, visited at least thirteen towns, some of which had large populations. The evidence was conflicting, but Dr. Thorne feels justified in making the following inferences* as the conclusion at which he arrives:—

"I. That disease appears sometimes to have been produced in the human subject when the milk of cows suffering from foot and mouth disease has been freely used without being boiled. There is no evidence to show whether this affection is of a specific nature or not, but it seems to consist in a derangement of the alimentary canal, accompanied by febrile disturbance, the presence of vesicles on the mucous membrane of the mouth and tongue, which having ruptured, leave superficial ulcerations and, at times, a herpetic eruption (small water blisters) about the exterior of the lips.

"II. That in a very large number of cases the milk of cows undoubtedly affected has been used without producing any noticeable effects. This absence of results may, though only to an inconsider-

* Twelfth Report of Med. Officer, Privy Council, p. 298.

able extent, have been due to the smallness of the consumption and the boiling of the milk."

Mr. Simon, chief medical officer of the Council, in summing up the results, thinks that "dilution of the milk and mere lapse of time may have to be taken into account, and that milk which after dilution or after some hours' delay does not infect might have infected if taken neat or fresh." He is "clearly of the opinion that the milk of cows affected with the disease ought not to be unrestrictedly sold for human consumption."

While admitting that the disease as seen in man or animals is rarely, if ever, fatal, we deem it needful and proper to warn our citizens from using such milk, particularly for the food of young children.

In regard to the use of flesh of slaughtered diseased cattle, we must say that undoubtedly large quantities of it have been eaten in London and its vicinity, and there has been, according to Dr. Thorne, "no instance of any disease having been reported to him as resulting from the use of such meat." This statement is very different from asserting that disease never occurs; and we think that the fact that meat has been taken from diseased cattle should be of itself enough to condemn it. No meat should ever be allowed to leave the shambles in any part of this State without thorough inspection and permission for sale being given by a properly qualified person.

Overcrowding of Tenement Houses, and Want of Clean Streets, &c., in Boston.

In the month of July the Secretary of the Board called the attention of the members to the dangers liable to happen in Boston, from overcrowding in tenement houses, and from a want of cleanliness in alleys and streets. By a vote of the Board, the following letter was sent to the proper authorities:—

(copy.)

To the Board of Aldermen, *Health Commissioners of the City of Boston:*

The State Board of Health desire, respectfully, to call the attention of the health authorities of the city of Boston to the fact that the owners and keepers of tenement and lodging houses are not complying with the provisions of an Act of the legislature of 1868, chap. 281, General Statutes of Massachusetts. A large proportion

of the unfortunate poor are crowded into buildings whose construction sets at defiance the laws of health, whose yards and privies are filthy in the extreme, and whose general condition is such as to render them liable at any time to become centres from which pestilence may extend in every direction.

Very respectfully, your obedient servant,

(Signed) GEORGE DERBY, M. D.,
Secretary of the State Board of Health.

BOSTON, July 11, 1870.

A reference to the report by the Secretary upon the health of the city of Boston will show the influence of this letter. It seems to have been small indeed.

SMALLPOX IN MASSACHUSETTS.

The certainty and commonly perfect innocuousness of vaccination have been established by the experience of nearly a century of its use. Overwhelming evidence has been presented recently by Mr. Simon (Twelfth Report of English Privy Council) that the fears of vaccination occasionally contaminating the system are really not well founded. There must be many now alive who have heard at least of the horrible results of smallpox ravages before Jenner lived. With all these well-known facts before us, it seems strange that any town could allow the pest to grow rampant as it has been recently allowed to become at Holyoke in this State. For over two months this loathsome disease has been spreading in that town, and now (Dec. 25th) infests every part of it. The Secretary has visited Holyoke and had an interview with the selectmen and physicians. At his suggestion, a thorough districting of the town was made, and every arm is to have its vaccine safeguard placed upon it. No amount of *disinfectants* can cope with this dire disease.

The only way to thoroughly drive it from the United States is by a national law, as in England, requiring every parent to duly register his child after having been duly vaccinated. Meanwhile the laws of our State in regard to unvaccinated children not being allowed to go to school, and other laws relative to infectious diseases must have been grossly neglected in Holyoke to have such an unhappy result as has taken place at that town, viz.: up to Dec. 31st one hundred and sixty-seven (167) cases of

smallpox have occurred, of which thirty-six (36) or about one-quarter proved fatal. There are doubtless many survivors also who have been disfigured for life by the disease. In connection with this statement, the Board draws attention to the fact that several of our correspondents (see Report on Health of Towns) allude to the indifference and neglect of the people in regard to vaccination as being quite general, and fraught with great danger to the people when the seed shall fall among them.

In the Massachusetts Registration Report for 1868, we find the following on vaccination:—

"In Ireland vaccination was made compulsory in 1863. Since that period the Irish Poor Law Commissioners have carried out the provisions of law and the whole population has been vaccinated. The results are seen in the following figures, from which it appears that the Irish physicians have banished the smallpox from their island as Saint Patrick is said to have banished the snakes. Whereas, in the periods 1830–40, 1840–50 and 1850–60, the respective annual average mortalities had been 5,800, 3,827 and 1,272, in the years 1864, 1865, 1866, 1867, 1868, they were 854, 347, 187, 20 and 19, respectively. In the first half of 1869 the whole number was three. The deaths from smallpox in Ireland since 1866 have been so few that it is fair to suppose the cases have been generally imported from abroad. The population being about five and a half millions, we should have, if equally well protected, about four deaths a year in Massachusetts."

Special Investigations made under Direction of the Board during the Present Year.

The questions especially investigated either by individual members of the Board or by agents appointed by them are twelve in number. Some are of a more popular character and intended to diffuse information on sanitary matters among the people, while others are interesting to physicians chiefly. Most, if not all of them, however, contain more or less of the popular and also of the scientific element, and as such are commended not only to the notice of the legislature, but to that of every adult inhabitant in the State.

The following brief analysis is offered of these various papers:—

Poisoning by Lead.

By the Secretary, assisted by Prof. William Ripley Nichols, of the Massachusetts Institute of Technology, and by various Correspondents.

In this paper will be found correspondence from physicians in different towns of the State relative to their personal experiences. The essay is equally valuable to the student for the scientific thoroughness with which Professor Nichols has performed his part of the work, and to the citizen for the warnings it gives in regard to the employment of lead pipe for the conduction of water that is to be used for drinking or culinary purposes. It also presents facts regarding the danger incurred by those who drink cider or other acid drinks from faucets fastened with lead; and other analogous facts tending to show the evil effects of cosmetics containing salts of lead.

Trichiniasis in Massachusetts.

By the Secretary.

The paper on this disease, which is caused by eating raw pork, or pork but partially cooked, is a frightful warning to the community. It should be carefully read by every parent when providing food for his family; and the essential point of it, viz., the necessity of *thoroughly* cooking lean pork before placing it on the table, should be known and duly appreciated by every cook in the land.

Health of Towns.

Arranged by the Secretary, aided by our Correspondents.

This document, prepared from returns made by correspondents, contains facts and deductions therefrom. Among the returns specially noticeable may be named the influence of residence on river banks, near swamps, pigsties or foul privies; details of wretched tenement houses (Boston) and stringent criticisms thereupon. In Brookline we see proof that the rich are more liable than the poor to some diseases; and at Concord we have the evil influence of irregular flowing of lands by mill-dam corporations, and an admirable example of wise sanitary precautions used by a correspondent. At Hinsdale, the bad effects of overcrowding are found; and at Hadley, the influence of too many shade-trees. In Northborough we have allusions to the effect of wet soil on the prevalence of consumption. One town has its threatening of future pestilence unless better

drainage be brought about by the citizens or by an active board of health. Suggestions in regard to infectiousness of consumption we have from Rockport. At Taunton our correspondent has opinions on the influence of a want of sunlight on the homestead. A gross neglect of vaccination is apparent in various towns, as Billerica, Holyoke,* Worcester, &c. The straw business as a cause of consumption appears at Upton. These are only a few of the variety of questions brought up by our correspondents. It is well for every one to look at his own town, and see if any nuisances exist there and afterwards do whatever can be done to remove any evil existing. The Board hopes eventually to have similar returns from all the towns. The continuation of such annual reports will tend to enlighten the public mind on all sanitary matters.

Charbon, or Malignant Vesicle, in Massachusetts.

By Arthur H. Nichols, M. D., of Boston.

This paper contains a *résumé* of the latest views on the idea of contagion. These views, though still in debate, are important as presenting one of the actual phases of thought on the all-important, but very profound questions involved in the terms "infection" and "contagion." While recommending therefore the paper to the consideration of our scientific investigators of disease, the Board feels that the practical suggestions made in regard to the necessity of cleanliness and of free ventilation are of equal value to the practical manufacturer and laborer. The suggestions also with regard to the free use of carbolic acid as a disinfectant should be known by all engaged in working on hair at Walpole and other towns, and they are worthy of serious consideration by every physician who is called to treat a case of charbon.

Typhoid Fever in Massachusetts.

By the Secretary, aided by our Correspondents.

This contribution to the etiology of typhoid fever made by various correspondents throughout the State, with the summary of inferences that can be drawn from the letters made by the Secretary of our Board is worthy of attention by every householder. Pittsfield, knowing too well the truth of two of the

* See also special remarks on smallpox at Holyoke.

inferences, viz., that fetid smells and impure water can alike produce typhoid fever of a most virulent type, has now its able and efficient board of health that foresees the evils threatened, and by determined action or timely warning arrests trouble. The State Board of Health feels that it cannot give any better advice than that every town should have an equally active board of health, and every inhabitant should read carefully the various letters, and, after doing so, should make his or her own inferences as to the condition and wants of his or her own town. The paper is also submitted to scientific investigators in the belief that, at least, it adds somewhat to our knowledge of the causes of this destructive disease.

Homes for the People.

The Chairman of the Board, having been obliged to reside during the past six months in London, availed himself of the opportunity thus offered of studying the homes of the poor of that metropolis and of learning what is now doing by public and by private philanthropy and capital in the matter of providing better homes for the people.

His letter to the Board presents the results of his investigations in reference to this most worthy object. The Board commend to the attention of the citizens the practical workings of the Peabody, Coutts and Waterlow buildings in fostering habits of cleanliness, temperance and self-respect among the people. To the last-named company, as proving that capital can combine with philanthropy, and each reap abundant harvests, the Board would especially call attention. Never was there a fairer chance or a greater necessity for similar operations than now exist in Boston.

The other subjects of Convalescent Homes in the country for broken-down but not really diseased persons, the matter of the use, waste and danger arising from Sewage, the Board deem worth the careful consideration of all.

The walks with the police in London and Boston, in their terrible and disgusting revelations, are solemn warnings, and, although perhaps to some minds, may seem ill-adapted for a report from a State Board of Health, are nevertheless entirely in accordance with the principles laid down in our first Report, as those upon which the Board was determined to act, viz.:

that "nothing which pertains to Humanity in its widest sense will this Board deem foreign to its aims."

Alcoholic Drinks. Their use and abuse.

With information derived from correspondence throughout the world.

The law establishing the Board requires it "to examine into and report what in their best judgment is the effect of intoxicating liquors as a beverage upon the industry, prosperity, happiness, health and lives of the citizens of the State. Also what additional legislation, if any is necessary in the premises."

These inquiries the Board deem of the highest importance. For years they have been the sources of violent language, or of party zeal alike in the privacy of home life, and upon the political arena. For years public sentiment in the Commonwealth has fluctuated between the extremes of action and of reaction on this matter. Meanwhile it seems certain that, while throughout the State there is less drunkenness than formerly, it never was more rampant than now in Boston and some of the larger cities. This habit the Board believe to be infinitely deleterious "to the prosperity, happiness, health and lives of the citizens." The records of our courts, and the knowledge which every one has of its effects in the private family assure us of this fact. *The evil is enormous.* How to remedy it is the difficulty.

In the hope of being able to lift the question of the use and abuse of intoxicating agencies above the region of partisanship and to enable the people of the Commonwealth to know how, more or less generally, human nature tends, the world over, to use and at the same time to fall into the vice of immoderate indulgence in intoxicating drinks, a circular was sent to the American Ministers at foreign courts, and to the Consuls of all the principal ports on the globe. It was designedly made as brief as possible—because we hoped thereby to get a greater number of responses than a more elaborate programme would have obtained. The Board presents the correspondence from Europe, Asia, Africa, North and South America, the isles of the Pacific, as well as from the State at large in the hope that the effort has not been in vain. From representatives of the United States in foreign countries we inquired what are the kinds of intoxicating drinks used, and what amount of crime do they

produce. These two questions it was unnecessary to put to our medical correspondents in Massachusetts who are more especially cognizant of the effects upon public health. Every member of this Board, and indeed every citizen knows that intoxicating drinks are the direct cause of a very large proportion of all the crime which is committed among us.

The foreign correspondence is not yet wholly finished. Letters have arrived within the past few days. It will therefore be impossible thoroughly to analyze the whole in all their various bearings. We hope to do this at a future time. Meanwhile certain general inferences we think can be drawn from this correspondence.

First.—Wherever we go, we observe that man finds some drink to use as a stimulus. Some nations use immoderately the more fiery, more potent liquors, and the results are infinitely more disastrous than are noticed among other nations using a milder beverage.

Second.—It would seem that the Northern nations of Europe, more especially the inhabitants of the British Isles and their descendants in America, tend to use immoderately these more violent liquors. The more Southern nations, except in the Southern States of this republic, use either milder articles altogether, or if perchance the stronger ones are drank, smaller glasses and fewer of them are taken.

Drunkenness is far less common among Southern than among Northern nations, but when it occurs is regarded with extreme aversion. It degrades its victims, in public estimation, in a far greater degree.

Third.—A curious physiological effect seems hinted at by some of our correspondents, viz.: that among Northern nations the vice of drunkenness is much more frequently the cause of violence and crime than in more Southern climes. In the North, men seem to become savage, wild and boisterous. The drunkard in the North beats his wife, and stabs his friend, or breaks into his neighbor's house under the influence of liquor. In the South he reels home rather happy in his insanity, and without any strong tendency to violence, or theft, or murder. We may add as a fact also that in *this* climate the Northern European cannot drink with impunity even that amount of alcohol he has all his life used in Europe.

Fourth.—It would seem from the correspondence that the practice of using stimulants is universal, and if unrestrained brings misery and death not only to him who indulges but often also to the community in which he lives.

If these conclusions are fairly deducible from such information as we have been able to collect from every part of the world, the question arises, what can we do to keep this universal tendency within proper bounds in Massachusetts?

The subject is, in some form, before the legislatures of all the States, and is everywhere recognized as one of difficulty. Men equally earnest in their desire to reach the evil differ in opinion as to the best means to be used. This Board can suggest no specific remedy: they have no sources of information which can give them any peculiar advantage in proposing the modification of existing statutes. The details of law are not within their proper province, but they do most earnestly desire and recommend that the legislature may devise some plan by which dram-shops, or tippling-houses may be summarily suppressed throughout the State.

Recognizing also that the love of strong drink becomes at times a real disease, and as such controls its victims as completely as insanity can ever do, this Board earnestly urges upon the legislature the establishment of inebriate asylums, to be held as insane asylums are now established and held, under State guardianship, in various parts of the Commonwealth.

Mortality of the City of Boston.

Prepared by the Secretary, assisted by Frank W. Draper, M. D., of Boston.

This paper is presented in the conviction that from it may be deduced inferences of great importance to the future health not only of the city but of that of the State at large. The Board hopes that similar "health districting" of the various towns in the Commonwealth will be undertaken by the local boards of health. No more valuable work could be inaugurated. If such investigations were carried on thoroughly and conscientiously by every nation in all their various townships, we should, in ten years, know more certainly about many *causes* of disease than the medical profession has been able by its own unaided efforts to arrive at during the centuries of its existence. The deductions made by our Secretary from the

tables of Dr. Draper are few compared with what may possibly be drawn from them, but although few, they unmistakably point to the fearful neglect of the city authorities of Boston in reference to the sanitary condition of the metropolis; and the terrible penalty for this neglect is daily and hourly paid at the present time by the sacrifice of human life.

The remarks of the Secretary on the fact that houses are now *allowed by the city authorities to be built on land in a certain portion of the city that must be eventually raised at an enormous expense*, the Board submits with deference to the taxpayers of Boston as worthy of their especial notice, in order that the evil may be promptly checked. Unless this be done, a deteriorated sanitary condition of the inhabitants of the district will be the inevitable result.

Ventilation of School-Houses.

By A. C. Martin, Architect, of Boston.

This paper is based upon scientific principles relating to ventilation, and presents plans for carrying out the design in a practical way.

In most of our school-houses the object seems to be to get heat enough at any rate, and if ventilation is considered at all it is regarded as of secondary importance. Our school-houses are charged with carbonic acid gas and animal effluvia which undermine the health of both teachers and scholars. The removal of such deleterious influences is surely greatly to be desired.

We deem it important to remind those who have charge of the warming and ventilation of schools that it is no easy or simple matter, in our variable climate, to maintain a uniform temperature, and at the same time renew the air with such frequency as health requires. No methods of warming and ventilating the two and three story school-houses which it is now customary to build in our large towns, can be reasonably expected to be otherwise than expensive, and whatever they may be, they need the constant care of intelligent persons to insure their proper working.

The plans of Mr. Martin are believed to meet the necessities of the case.

Mystic Pond Water.

By the Secretary, assisted by Prof. Wm. Ripley Nichols, Massachusetts Institute of Technology.

The Board commends this paper to the notice of the scientist as well as to that of the citizen. It shows how a pollution which, at first sight, it would seem must necessarily cause contamination to the drinking water of several towns is rendered by the alchemy of nature, at present at least, comparatively harmless. At the same time it forewarns us of what must certainly occur if we allow the present impurities of Mystic Pond to be increased, by new and more numerous nuisances in the form of the refuse of tanneries, &c., being thrown into it. For a still further reason, the Board urges removal even of the present small nuisance, because the very filth, which tends to contaminate, might be saved and used for beneficial purposes, whereas it is now lost and at the cost, perhaps, of human health and life. For it is undoubtedly true that the very refuse which may tend to contaminate the drinking water of the citizens of Charlestown and of other populous places, might be used as a fertilizer by the farmer, or perchance in some operations in the various manufactories of the State.

Air and some of its Impurities.

By the Secretary, assisted by Messrs. A. H. Pearson, H. B. Hill, and Charles Stodder.

This article comprises a contribution to our accurate knowledge, of the amounts of carbonic acid gas contained in various open places in the cities of Boston and Cambridge, compared with what is found in our schools, churches, halls, theatres, &c. It is a record of carefully conducted experiments, and will, we hope, commend itself to American and European investigators on the subject. It is interesting also to every one, even though he be not occupied with the scientific view of the matter, to observe how this deleterious gas collects in all badly ventilated places.

The letter from Mr. Stodder is a truthful statement of the views of an experienced microscopist, upon the difficulties connected with microscopic investigations relative to the "germ" theory of disease. Although it seems to teach us but little on that subject, it does us substantial service when it tends to

check the exuberant imaginations of many about "organic germs," of which we have heard so much the past year.

The practical suggestion also of the possibility of preventing the dust, of iron and steel filings, from flying about the air of machine shops, and thereby saving life by means of magnets, is worthy of the attention of master-machinists who desire to promote the well-being of their operatives.

Health of Minors Employed in Manufactories of Cotton, Woollen, Silk, Flax and Jute.

By the Secretary, assisted by Frank W. Draper, M. D., of Boston.

This report is from the nature of the case imperfect. The difficulty in procuring the required information has been great. From many factories it has been found impossible to get returns. For this reason the subject cannot be said to be completely examined, and its great importance demands still further investigation.

Meanwhile it is gratifying to the Board to find that with these imperfect returns, there is no suggestion of the existence of greater mortality or sickness, among the operatives than in the State at large.

In reading this report the Board feels the great importance of the question, now much debated in Europe, as to the registration of disease. If every corporation in the State were obliged by law, under a penalty for non-performance of the duty, to make annual returns of the number of days lost by their employés by reason of sickness, and if all hospitals and dispensaries were required to give similar information, a great deal might be learned important to the future health of our citizens.

Sewing Machines.

Early in the year the Board took measures for careful investigation, as to the truth or otherwise, of the statement widely circulated, that constant labor by women on sewing machines moved by foot-power, was undermining health, and was productive of various complaints peculiar to women. They engaged a physician of experience and skill, and having a wide practice among the operatives of one of the cities of the State to report upon the subject. The importance of the matter is understood

by the Board, and they regret to say that only within the past few days has the gentleman found himself unable to perform the services agreed upon. At present, owing to lack of the time necessary to make a complete examination, it is impossible to do more than to promise information on this subject as soon as it may be obtained, and, if deemed of sufficient importance, some publication may be made before our next annual report.

Expenses of the Board.

It will be seen by the following statement of accounts that our Board has expended $2,288.35, which is less than half of the sum which the legislature appropriated for our use in 1870.

We trust that the same liberality and the same generous confidence in the intentions of the Board will be continued in 1871. It is always necessary to have some reserved fund for extra work which may suddenly occur.

The Secretary has already in behalf of the Board asked for an appropriation equal to the sum granted last year. If this be allowed, we shall promptly enter upon new tasks and with renewed zeal; in full confidence that all money expended by us will in the end be amply repaid to the State.

All which is respectfully submitted.

HENRY I. BOWDITCH,
P. EMORY ALDRICH,
WARREN SAWYER,
GEORGE DERBY,
WM. C. CHAPIN,
RICHARD FROTHINGHAM,
R. T. DAVIS,

Members of the Massachusetts State Board of Health.

Boston, January 18, 1871.

EXPENSES OF STATE BOARD OF HEALTH—1870.

Postages and stationery,	$429,28
Travelling expenses of Secretary,	57 59
Express charges and soldier messengers,	57 60
Printing,	100 86
Personal expenses of members while engaged in the duties of the Board,	148 29
Paid for special investigations,—	
Concerning Air,	271 66
Water,	200 00
Charbon,	125 00
Ventilation of school-houses,	125 00
Mortality of Boston,	255 00
Typhoid fever,	103 50
Health of factory operatives,	30 00
Furniture and philosophical apparatus,	98 92
Copying, translating, &c.,	210 90
Miscellaneous,	74 75
	$2,288 35

REPORT OF THE SECRETARY.

To the State Board of Health.

GENTLEMEN :—I have occasion to add but little to the record of the year's work which is presented in the accompanying reports.

An extensive correspondence has been kept up with all parts of the State, and many visits have been made to the different towns, for the purpose of consultation with the local boards of health.

I have lectured on subjects connected with public health in Amherst, Springfield, Boston, Worcester, Charlestown, Salem and Lowell. It gives me pleasure to assure you that everywhere I have met with evidence of the great interest which is felt in the operations of our Board by the selectmen of towns, members of the medical profession, and by the people generally.

Physicians are the natural guardians of public health. They know better than any other class in the community that many diseases are avoidable—that it is easier to keep well than to get well—that prevention is better than cure. These convictions have led them to co-operate most heartily in the inquiries undertaken by our Board. Two hundred physicians, in as many different towns, have contributed information on the special subjects investigated in the following pages. Many of these gentlemen are of eminence in their profession, and their practice and observation may be said to extend over nearly the whole territory of Massachusetts. In many instances the smaller towns have no resident physician. In the letters of our correspondents, as arranged for publication, I have separated the various topics, that each subject standing by itself might be the better understood.

The report of deaths from all prevalent diseases in the largest cities and towns, has been published every Wednesday during the year in the Boston Morning "Journal." I desire to express my thanks to the clerks and registrars who have aided me in collecting this information.

Very respectfully, your obedient servant,

GEORGE DERBY,
Secretary of the State Board of Health.

BOSTON, January 18, 1871.

POISONING BY LEAD PIPE

USED FOR THE

CONVEYANCE OF DRINKING WATER.

POISONING BY LEAD PIPE.

One of the questions addressed to our correspondents, in the circular of April 8, 1870, was as follows:

"Have any cases of lead colic or lead paralysis occurred in your town or district, in which you have been able to trace the origin of the disease to water-pipes?"

The replies are from one hundred and seventy correspondents, in as many different places, and are as follows:

Yes,	41
No,	101
Doubt expressed,	20
No lead used in the town,	8

It is stated that in certain towns lead pipe is only used to convey water from springs, and that, when allowed to flow continually without plugs or stop-cocks, no harm has been known to follow.

The negative replies are very brief, and may be construed as meaning generally that no bad effects have been observed, rather than that, in the opinion of the writers, none may occur from the contact of drinking water and metallic lead.

The affirmative replies are direct and positive, and are usually accompanied by evidence. They occasionally refer to other accidental modes of poisoning by lead, as by hair-dyes, which are almost universally composed of acetate of lead and sulphur in various proportions; also by cider and vinegar drawn through lead faucets.

Information relating to this general subject is given in the following extracts from letters of our correspondents:—

Ashland.—Three cases of lead poisoning through water-pipes are reported. Two, which occurred eighteen months ago, were in the same family: a father, aged sixty, and his daughter, aged twenty-four. The latter was the first affected, and her case for a considerable time was obscure. "She had no colic from first to last, but a series of indefinite ailments for which three of us physicians could assign no satisfactory cause; anœmia, pain in epigastrium, with nausea and vomiting, neuralgia occasionally in limbs and chest; bowels not constipated. Gastric ulcer, or carcinoma, were suspected. Lead poison was thought of, but there being no blue line on the gums, and no paralysis, the idea was given up. About the fifth month amaurosis occurred; but we groped in the dark three weeks longer. At this time her father was attacked with severe colic, and as the bowels were constipated, I examined the gums and found a well-marked blue line." The mystery was solved. The drinking water was brought into the house through fifty feet of lead pipe from a well in the stable. The daughter subsequently had wrist-drop. On removal of the cause, and with appropriate remedies, both father and daughter completely recovered.

The third case was in January, 1870. A French Canadian, aged thirty, exhibited the characteristic signs of lead poison, colic of great severity, constipation, blue line of the gums. The cause of these symptoms was found in the drinking water, which was brought into the house from a well, through forty feet of lead pipe. This water had also to flow through a box in the cellar, as large as a water pail, which was lined with lead. On removal of these causes, and with appropriate remedies, this case also recovered.

Amherst.—Two cases are reported; one of them having all the characteristic signs, — colic, constipation, partial paralysis, lead jaundice, blue line of gums. Analysis of drinking water in both cases yielded confirmatory evidence of the presence of lead, and both cases recovered on removal of cause.

"The water of our wells and springs in this neighborhood, especially in gravelly soil, is characterized by the presence, in large amount, of carbonic acid, and an almost absolute absence of sulphates."

Abington.—Our correspondent reports a case of lead paralysis, caused by drinking water conveyed four rods through lead pipe. Now under treatment.

Athol.—No cases have come under the immediate observation of our correspondent; but three cases in one family occurred in the

town two or three years ago, in which the disease was directly traced to lead water-pipes. In one of the cases there was partial paralysis.

Andover.—Lead water-pipes are very generally used, but no cases of colic or paralysis have resulted from it. In some instances, injury to health from their use was suspected. The pipes are often found much oxidized.

Attleborough.—In one instance, repeated attacks of abdominal pain ceased to recur after the removal of lead pipe from the well. In another, where the general health was undermined, with paralysis of the extensors of both arms, recovery commenced after the use of water conveyed through lead pipe was discontinued.

Barre.—Case of a middle-aged man, long sick and treated for rheumatism; finally there was partial paralysis of both wrists and ankles. He used water conveyed through lead pipe. Removal of the pipe, which was found to be very much corroded, and in some places nearly perforated, was followed by gradual, though incomplete recovery. He subsequently died suddenly, and, as reported, from pleurisy.

Brimfield.—One case reported with unmistakable signs of lead poisoning. Advised giving up use of water conveyed through lead pipe, but the man persisted in using it; and, finally, died unconvinced. A large proportion of people in this town use lead pipe for conveying water and do not suffer from it.

Bridgewater.—A case is reported of a boy eight years old, who had epileptiform convulsions, gradual decline, partial loss of speech and power of motion. The cause was not suspected for a long time, but when at last discovered and the lead pipe removed from the well, the boy completely recovered.

Nearly all lead pipes are now removed from wells in this vicinity.

Blackstone.—"I have been able, I think, to trace several cases of lead paralysis to the use of some of the hair preparations now in use. Cannot say that I have been able to trace it to water drawn through lead pipe."

Concord.—Our correspondent has met with no cases of lead disease from water pipes for some years past, but furnishes a report

of several which occurred in his practice in 1853, and expresses his opinion that similar instances of lead poison occur more frequently than is generally supposed, the cause being unrecognized. In the cases referred to, four persons were afflicted with lead disease, and brought near to death by drinking water conveyed through lead. The water was found to be charged with salts of iron from a meadow in which existed a bed of iron ore, and through its action upon the pipes, soluble salts of lead were produced in abundance. Removal of the pipe was followed by recovery of health.

Erving.—"The only cases of poisoning from lead pipe which I have observed here were caused by drinking cider drawn through a lead syphon which was allowed to remain in the barrel."

Essex.—One case reported. A man about fifty years of age was subject to attacks of epigastric pain and neuralgia. Cause not suspected until the extensor muscles of the arm became paralyzed. It was then found that he was drinking water conveyed twelve or fifteen rods through lead pipe. This being discontinued he gradually recovered.

Fitchburg.—A good many cases of lead disease, supposed to be from the use of lead water-pipes, occurred from ten to eighteen years ago, but none recently. The use of lead water-pipes is not wholly abandoned, but medical and popular discussion of the subject has greatly diminished their use, and very generally induced more caution.

Framingham.—Nearly all the members of one family have suffered from the various forms of lead disease, traced directly to the influence of water conveyed through lead pipe.

Gloucester.—"I have met with some three or four cases of disease occasioned by drinking water drawn through lead pipe. The symptoms, at first, were generally colic and constipation. This has been followed by partial paralysis.

"In one case the patient was the only one affected out of a large number who used the water. He had paralysis of the extremities, persisting for two months. That the lead poisoning was due to the pipe seems to me evident from the fact that a recurrence of the primary symptoms supervened upon resuming the use of the water drawn through the lead pipe, which speedily subsided on discontinuing its use."

Groton.—Several cases of lead poison from water are remembered. In one, the case was treated for three years unsuccessfully, the cause not being recognized. Recovery followed rapidly on removal of lead pipe used for conveyance of water thirty rods.

Hubbardston.—"I have seen, during my practice in this town, two cases of partial paralysis which I believe to be due to the presence of lead in the system; and I am confident they occurred from the excessive and continued use of hair-coloring and hair-dressing preparations containing lead in solution. Both cases recovered on discontinuing their use."

Holyoke.—"In 1867 and 1868 a case was under my observation of gastric and intestinal derangement, with impaired use of the forearms and hands, which I suspected came from using water drawn through lead pipe. The service pipe was changed and the case was discharged cured some weeks afterwards."

Hyde Park.—A number of cases of suspected lead poisoning have been seen to improve after the removal of lead pipe from contact with drinking water.

Leverett.—Several cases have occurred. One of a lady who suffered for two years from partial paralysis of arms, and other equally marked signs of lead poison, and recovered her health after the removal of forty rods of lead pipe through which drinking water was conveyed. Another of a very similar kind, but in a different locality, with colic, great debility and finally "drop-wrist," from which recovery was speedy on removal of the lead pipe. Our correspondent has also met with cases of lead poison from the use of hair-dyes composed of sugar of lead and sulphur.

Our correspondent expresses the most decided opinions on the general subject of lead poison through water-pipes and hair-dyes, and believes that very large numbers of persons are unconsciously undermining their health through minute doses of lead administered in this way.

Monson.—One well marked case of lead poison in an excessive water drinker who got his supply through one hundred rods of lead pipe with very little fall. Lead water-pipe in very general use, but the above case the only one in which harm has been known to result from it. A fatal case of lead disease reported from the use of cider drawn from the barrel through a lead faucet.

North Andover.—A case of lead disease reported by our correspondent, from the use of a chain-pump, about which lead was used to prevent the water leaking down the chain.

North Adams.—In the course of twenty-five years' practice, some cases are recalled of illness supposed to be caused by water conveyed through lead pipe.

Northampton.—"The following cases of lead poisoning from the use of water drawn through leaden pipes are brought to the notice of your Board, as a matter peculiarly pertaining to the public health. The neighborhood in which the suffering family reside is very generally using water drawn through lead pipes, and is not disposed to accept the theory of poisoning from this source. The family of Mr. H., consisting of himself, wife, daughter and son-in-law, reside in Westhampton. Mr. H. removed to the farm he now occupies, seven years ago. Mrs. H. has lived on the place many years with her daughter; and the son-in-law, Mr. E., joined the family in November, 1868. Mr. H., aged fifty-seven years, had always enjoyed good health until the spring of 1869. Early in May he found himself losing flesh and strength, tormented continually with an unpleasant constriction and pinching in the abdomen and with pains in the extremities, not following the course of any of the large nerve trunks. June 19, he had an attack of colic so severe as to require the attention of his family physician. These attacks were repeated many times, and accompanied with obstinate constipation and nausea for many days. The abdomen was uniformly and considerably depressed and the blue line on the edge of the gums well marked.

"Mrs. H., aged fifty-seven, with good general health heretofore, had similar symptoms. Mr. E., the son-in-law, was still more severely afflicted, being extremely emaciated and feeble. His general appearance was like that of one suffering from malignant disease, and without the blue line and the family history to aid me in the diagnosis, I should have expected to find a cancerous development somewhere. The source of all this trouble was near at hand. The water which the family used was drawn from a well in the cellar through a one and a half inch pipe, extending from the bottom of the well to the sink in the kitchen, about forty feet. This same arrangement had been in use in this house for twenty-four years. The well was walled up with brick, fed from a spring at the bottom, and the water stood generally about six feet deep. The lead pipe passed through the wall above the surface of the water

then down to within six inches of the bottom of the well. The water in this well, as in the neighborhood generally, percolates through a gravel subsoil and is called *soft*. The surface of the pipe inside and out was coated with a carbonate of lead, and in several places the pipe was much eroded. The water was analyzed by the professor of chemistry at the Agricultural College, Amherst, and reported by him to give evidence of holding lead in solution, with an unusual quantity of free carbonic acid. These cases all recovered completely on removal of the cause of their illness and with appropriate treatment.

"This question may be pertinent. How does it happen that this water has been used by one member of the family (Mrs. H.) for twenty-four years without evidence of poisoning, and then all the family suffer about the same time? I have only one explanation to offer, which may or may not be correct. The wooden cover had become decayed and portions of it had fallen into the well. The decomposing wood had supplied the excess of carbonic acid gas necessary to act upon the leaden pipe."

Northborough.—"I can recall eight cases of lead colic where the unmistakable cause was drinking water pumped through lead pipe; three cases from water from an aqueduct, two cases from water drawn from a well with a bucket made from a whitelead keg, and one case caused by drinking cider drawn through a lead faucet."

Pepperell.—"I have now under treatment several cases of partial paralysis, caused, I have no doubt, by the use of water taken through lead pipe. The most prominent symptoms are these: *mental depression;* paralysis more or less complete of the extensor muscles of the forearm, with dropping of the wrists; inconvenience in walking over uneven surfaces, there being inability to extend the foot to avoid accidents; distinct blue line along the margin of the gums.

"In no instance had these persons come in contact with any form of lead in an unusual manner, except by lead pipe being used to convey water for domestic use. These cases are peculiarly interesting to me, witnessing, as I do, the effects upon different members of the same family."

Rutland.—"Lead pipes for pumps and aqueducts are in universal use. No instance of lead colic or paralysis has occurred to my knowledge in the last twenty years."

Sherborn.—"I remember but one case in which poisoning from lead water-pipe was suspected. There was temporary paralysis of the extensor muscles of the arm and the blue line on the gums. The patient was a boy and made a good recovery after treatment and the removal of the lead pipe. No other member of his family was affected. Lead pipe for the conveyance of water is very generally used here."

Shelburne.—"I have known four cases of lead colic, two of them complicated with paralysis. Three recovered and one died. All of these persons used water from lead pipes."

Sterling.—"I am convinced that the universal use of lead pipe for water conduits has had a prejudicial effect on the health of the people of this town in years past and evidences of lead poisoning are apparent in some patients now under my treatment."

Sudbury.—In forty years' observation no cases of lead colic or lead paralysis have been seen which could be directly traced to water pipes, but our correspondent believes lead to be an unsafe metal to be used for the conveyance of water, and is recommending its removal and the substitution of other materials free from the suspicion of danger.

Taunton.—A few cases of paralysis from the absorption of lead, supposed to come from lead pipes and cisterns, have been observed.

Tewksbury.—A case is reported of lead poisoning from long continued use of a hair-dye containing sugar of lead.

Uxbridge.—No case of lead poisoning from water pipes known to have occurred in Uxbridge, but in a neighboring town two cases were recently seen by our correspondent. Water was brought from a well through lead pipe, and produced in one instance lead colic and in the other "drop-wrist" before the cause was discovered. The water treated with sulphuretted hydrogen showed the presence of lead in abundance.

Upton.—One case reported by our correspondent as distinctly traceable to lead-pipe water. Other cases of colic and partial paralysis have occurred in which this cause was suspected but not proved.

Ware.—A case of neuralgia in which lead disease from water pipes is suspected, now under observation. Our correspondent in Ware reports a case of lead disease, although not from water pipes, which is curious and instructive.

"An old gentleman, a farmer, had colic, constipation and finally drop-wrist. It took me a long time to find out from whence the lead which had evidently caused these symptoms could possibly be obtained, as the water was from an old oaken bucket and no paint was used about the house or on any of the cooking utensils. But I made every inquiry and at last discovered that the old man was fond of vinegar and water, sweetened, for a drink; and thinking it nicer freshly drawn, was in the habit of going to his barrel and drawing a little into his glass through a lead faucet!

"This source of danger in his case came very near being an unsolved mystery, but happily it was at last made manifest."

Watertown and *Belmont.*—Lead disease occasionally seen and almost without exception in the form of colic. Several cases reported. A middle-aged man, a shoemaker, lived with his wife for three years in a house supplied with water through lead pipe. He had no family. The wife, with more active habits, never showed distinctive signs of lead poison, but was never quite well. The husband had lead colic of the most violent and obstinate character. Another case was of a little girl who was constantly drinking from the faucet which supplied the basin in her mother's chamber. The lining of the tank from which the water was drawn was found to be oxidized.

In a second letter our correspondent says: "I think I stated that I had seen the effects of lead poisoning manifested almost invariably in the form of colic. I now recall a single exception, which was the case of a lady who suffered from a neuralgic affection of the limbs, especially the arms, which were lame, painful and weak. The water she had been in the habit of drinking was found to contain a large proportion of lead. The use of lead-water was discontinued and the symptoms eventually disappeared.

"One case more of suspected lead affection, that of a woman who was teased and annoyed for a long period by abdominal pains, not severe and sharp like those of ordinary colic but dull and wearing. I believed the cause of this trouble to be the use of water which came from a painted roof. She recovered perfectly."

Wakefield.—Two families affected; both entirely recovered on

removal of the lead pipe. In one of these cases there was paralysis of the extensor muscles of both hands.

Webster.—"There have been several cases of colic and a few cases of paralysis in this vicinity, directly traceable to the use of water drawn through lead pipe. A case of lead paralysis caused by drinking cider drawn through a lead faucet was also under my observation a few years ago."

Waltham.—Several cases of lead poisoning from water pipes occurred in this town in the practice of the late Dr. Horatio Adams, and were published by him in the Transactions of the American Medical Association, Vol. 5. Our correspondent has recently seen a case which was caused by water drawn through lead pipe from a brick cemented cistern.

Westminster.—Two cases of lead palsy traced to the use of water drawn through lead pipe. Extensor muscles affected. One was relieved by omitting the water; the other was incredulous as to the cause of his trouble, and has been permanently injured. He has had "wrist-drop" for several years.

West Boylston.—Some cases of lead disease from water-pipes have been seen, but they are not common. People are beginning to understand that water confined in lead pipes is dangerous, and are more careful than formerly. Our correspondent has seen paralysis, colic, a blue streak around the gums, costiveness and extreme emaciation caused by drinking water that had been stagnant in lead pipes.

Wilbraham.—One case of facial paralysis observed which was supposed to be due to the use of hair-dyes.

Worcester.—No cases of lead poisoning from water pipes observed since the introduction of "city water." Before its introduction many cases of colic and partial paralysis were seen, apparently due to lead pipe in wells. On removal of the suspected cause the symptoms disappeared.

Wrentham.—"Instances have occurred where I think I have been able to trace the origin of disease to lead water-pipes. There is a hilly section where a dozen families are supplied with water from an excellent spring, a fourth of a mile above them. It is brought through lead pipe. These houses are also supplied with

good wells. I think I am correct in saying that every one who uses the water conveyed through the lead pipe for any time is injured by it. The complaints are varied; generally abdominal pain and neuralgia. Lately I have in a measure dissuaded the people from its use. The flow is not constant; it only moves as it is drawn upon."

In addition to this information directly from the towns, there are many similar cases reported in the "Boston Medical and Surgical Journal" as having occurred in Massachusetts during the past fifteen years. They are of the same general character as those already given, and it is therefore unnecessary to reproduce them. They may be found in Vol. LIV. p. 21; Vol. LV. p. 428; Vol. LVI. p. 422; Vol. LVII. p. 368; Vol. LIX. p. 99; Vol. LXI. p. 480; Vol. LXXVI. p. 37.

The Transactions of the American Medical Association, Vol. V., also contains a report on the subject, with many interesting cases occurring in the neighborhood of Boston, by the late Dr. Horatio Adams of Waltham.

The special action of the water of Lake Cochituate (Boston water) on lead pipe, and the amount of lead it is capable of dissolving under various circumstances, have been investigated, by request of the State Board of Health, by Mr. Wm. Ripley Nichols, Assistant Professor of General Chemistry in the Massachusetts Institute of Technology, who presents the following

REPORT:

GEORGE DERBY, M. D., *Secretary of Mass. State Board of Health:*

DEAR SIR,—At your request I have made a number of determinations of the amount of lead contained in Cochituate water under the ordinary circumstances of its use; and in this connection I would present the following statement with regard to the action of water on lead in general:—

Perfectly pure water, in the absence of air, has no action on metallic lead; if, however, lead be immersed in rain water or in ordinary distilled water there is almost immediate action, and if, after the lapse of a few minutes, the liquid be agitated, there will be seen an abundance of white scales of the hydrated oxy-carbonate of lead. This violent action seems to be due, in considerable measure, to salts of nitrous acid, especially nitrite of ammonium, always present in such water, and to be effected by the formation

of some nitrous compound of lead which is more soluble in water than the oxy-carbonate, into which it is almost immediately converted by the carbonic acid of the air or by that which is dissolved in the water. In all waters also, hard and soft, there appears to be formed at first an oxide, (or hydrate,) and this also is more soluble than the oxy-carbonate; if lead be partially submerged in water, there will always be found on it, after some days, at the surface of the liquid, yellowish white crystals of hydrate of lead, along with the crystals of the oxy-carbonate. The bluish gray coating which forms on the surface of lead exposed to a moist atmosphere is a practically insoluble suboxide.

It may be asserted that in all natural waters lead suffers corrosion to a greater or less extent. All the conditions upon which this action depends are not accurately known, so that we cannot say *a priori* whether a given water will act slightly or violently on the metal with which it may come in contact; moreover, there is considerable diversity of opinion as to the effect, in this regard, of the presence of various individual salts; still, it seems to be very generally agreed that the influence of sulphates, phosphates and carbonates is protective, not only because the presence of these salts lessens the power of the water to dissolve oxygen and carbonic acid from the air, but also on account of the formation of a coating of lead compounds, which coating is but very slightly soluble itself, and at the same time prevents the direct contact of the water and the metal.

In regard to the solubility of the various salts of lead: one part of the sulphate requires 20,000 parts of cold water for its solution (Fresenius); the carbonate requires 50,000 parts of water (Fresenius); the oxy-carbonate is but very slightly soluble (Yorke), while the phosphate is altogether insoluble (Mitscherlich, Fresenius). The solubility of the carbonate and oxy-carbonate is so slight, that it is ordinarily stated that water contaminated with lead from lead-pipes or tanks may be rendered harmless by standing for a certain length of time exposed to the carbonic acid of the air, and Faraday proposed (Rep. Chim. App., I., 498,) the addition of powdered chalk to water collected from a lead-covered roof, asserting that the lead was thus entirely precipitated and the water made potable. With regard to the other salts of lead, the suboxide is absolutely insoluble (Horsford and others), the hydrated oxide is soluble in 7,000 (Bonsdorff) or 10,000 to 12,000 (Yorke) parts of water, while the chloride and nitrate are much more soluble, the chloride dissolving in 135 parts of cold water (at 12.5°C., Bischof), and the nitrate in about three parts of water at the ordinary temperature.

The greatest amount of protection seems to be afforded by the presence of carbonate of lime held dissolved by an excess of carbonic acid, a coating of carbonates of lime and lead being formed in such case; yet some observers assert that a large excess of carbonic acid exercises a solvent action on carbonate of lead (see Miller's Inorganic Chemistry, under Lead). Other observers deny this fact (see Noad.—Chem. Soc. Jour. IV., 1852, pp. 20–26). The influence of nitrates and chlorides is felt to be pernicious; organic matters, which under certain circumstances cause corrosion of the metal, as they contribute to the formation of a difficultly penetrable coating, are to be classed with the protective agents.

In the distribution of water through lead-pipes, there are other circumstances which exert more or less influence on the action of the water on these pipes. The corrosion is recognized to be more considerable where the pipe has been sharply bent, where other metals, as in the case of solder-joints and stop-cocks of metal or alloy, come in contact with the lead, and where the water is transmitted through the pipes at an elevated temperature. In regard to the action of iron-rust coming from the mains, authorities differ; Horsford distinctly states (Proc. Am. Acad., II., 64,) that hydrated peroxide of iron in water is not reduced by lead, and consequently that we "may infer the freedom from corrosion of leaden pipes connected with iron mains, as far as the reduction of the pulverulent peroxide of iron may influence it;" Hayes, on the other hand, asserts that the ochreous deposit from the iron mains *assists in the corrosion.* It is a question whether there may not be a certain galvanic action between the iron-rust and the lead, or even between the coating of lead compounds and the lead itself; it is, moreover, well-known that if a bit of mortar or plastering falls into a lead-lined tank, or is carried into a lead-pipe, there is rapid corrosion in its immediate vicinity,—so that the influence of carbonates may not be altogether for good.

When the introduction of Cochituate water into Boston was under discussion, Professor Horsford of Cambridge made a series of experiments with regard to the action of the Cochituate, as well as of other waters, upon lead (see Boston City Documents, 1848, Nos. 18 and 32; also Proc. Amer. Acad., II., p.,64). He concluded that lead pipes could be used with safety for its transmission, and that the coating formed would be to such an extent insoluble and impenetrable, that after a certain time the action of the water would be practically nothing. These experiments in the laboratory have a certain value, yet too much importance must not be given to them, performed, as they are, with small quantities of water and

with a limited amount of metallic surface, and with the relative amounts of the two so different from those that are brought together in actual practice. Indeed, experience has shown that some waters, which in the laboratory seemed to corrode lead but slightly, really act very violently on the pipes through which they are conveyed.

With regard to the action of the Cochituate water on lead, we should infer from the small quantity of chlorides and nitrates, and from the proportionally large quantity of carbonates,* that this action would not be very considerable, and we are now in a position to determine from the actual experience of so many years how much it really amounts to. I have tested many samples taken from the pipes under various conditions, and have never failed to find indications of the presence of lead. The following *quantitative* determinations were made :—

No. 1.—Water dipped from the upper part of Cochituate Lake in a glass jar, August 31st, 1870.—1,000 c. c. of this water failed to give indications of the presence of lead.

No. 2.—Water from one of the drinking-fountains on Boston Common, July 20th.—100,000 parts of this water contained 0.0415 parts metallic lead, equivalent to 0.0242 grains to the U. S. gallon of 231 cubic inches.

No. 3.—Water from private residence, No. 137 Walnut Avenue, July 19th.—The water is delivered through a hundred feet or more of tin-lined pipe, and then through 10 or 12 feet of lead pipe. The pipes have been in

* Professor Silliman's analysis of the water was as follows: No. I. being from the part of the lake from which the aqueduct starts; No. II. from the other, the upper, end of the lake.

	I.	II.
Chloride of Sodium,	.0323	.2540
Chloride of Potassium,	.0380	–
Chloride of Calcium,	.0308	–
Chloride of Magnesium,	.0764	–
Sulphate of Magnesia,	.1020	–
Sulphate of Soda,	–	.0843
Sulphate of Alumina,	–	.0146
Alumina,	.0800	–
Sulphate of Lime and Silica,	–	.5700
Phosphate of Alumina,	–	.1700
Carbonate of Magnesia,	.0630	.2560
Carbonate of Lime,	.2380	.3860
Silica,	.0300	–
Carbonate of Soda, equivalent to nitrates and crenates, *and loss*,	.5295	.4757
	1.2200	2.2106
Carbonic Acid, average cubic inches to gallon,	10.719	4.549

(See Water Commissioners' Report, Boston, 1845.)

I find that the water as drawn from the pipes in the laboratory of the Institute contains 0.217 grains of chlorine to the United States gallon, and a mere trace of nitrates.

use some six months.—100,000 parts of the water contained 0.0342 parts metallic lead equivalent to 0.0290 grains to the gallon.

No 4.—Water from hot water pipes of same dwelling-house as No. 3, July 21st. This water passes through 40 additional feet of lead pipe, through a lead-lined tank and through an ordinary copper boiler.—100,000 parts of this water gave 0.191 parts metallic lead, equivalent to 0.112 grains to the gallon.

No. 5.—Water from the Chemical Laboratory of the Massachusetts Institute of Technology, drawn June 25th, early in the morning, after standing some 14 hours in the lead pipe which is about 150 feet long and has been in use several years.—100,000 parts of this water contained 0.098 parts metallic lead, equivalent to 0.057 grains to the gallon.

No. 6.—Water from the same pipes as No. 5, after running out enough to clear the pipes.—100,000 parts of this water gave 0.0307 parts metallic lead, equivalent to 0.0179 grains to the gallon.

No. 7.—Water from private residence, No. 8 Sawyer Street, Sept. 20th. The water had been let into the pipes only four days previously, and, at the time the sample was taken, had remained in the pipes for three or four hours. The pipe (lead) is some fifty feet in length.—100,000 parts of this water gave 0.073 parts metallic lead, equivalent to 0.0427 grains to the gallon.

No. 8.—Water from private residence, Kendall Street, Sept. 26th. This water was let into the pipes some four months since, and none had ever been drawn previous to this time.—100,000 parts of this water gave 0.0937 parts metallic lead, equivalent to 0.0547 grains to the gallon.

I would also record the following determinations.*

No. 9.—Mystic Water from private residence, No. 12 Adams Street, Charlestown, 7½ o'clock A. M., Sept. 6th. There are about 50 feet of lead pipe which have been in use for 2½ or 3 years. Very little water had been drawn since July 1st.—100,000 parts of the water gave 0.120 parts metallic lead, equivalent to 0.0695 grains to the gallon.

No. 10.—Mystic Water from Kidder's Chemical Works, Charlestown. Drawn 7 A. M. Sept. 6th, after remaining 13 or 14 hours in the pipes. Considerable quantities of water are used, and the pipe, 200 feet in length, has been in use four or five months.—100,000 parts of this water gave 0.120 parts metallic lead, equivalent to 0.0695 grains to the gallon.

* In all cases the lead was weighed as sulphate. Two liters of the water were evaporated to fifty c. c., with previous addition of nitric acid, and filtered. The incinerated filter was treated with nitric acid, the excess of acid driven off, the residue taken up with water and the solution filtered through a minute filter into the mass of liquid to be tested. Sulphuretted hydrogen was now passed through the liquid which was allowed to be only slightly acid, the precipitated sulphide of lead was collected on a filter, moistened with nitric acid, treated with a drop of dilute sulphuric acid and subsequently ignited cautiously with the filter. To avoid error from reduction to metallic lead, a second treatment with nitric acid and dilute sulphuric acid took place, followed by ignition with proper precautions.

In view of the foregoing quantitative determinations (Nos. 1 to 8) and of a number of qualitative tests, from conversation with men of experience engaged in the plumbing business, and from personal examination of various samples of lead pipes which have been in actual service, I feel justified in asserting:—

(1.) That Cochituate water which has passed through lead pipes is never absolutely free from lead.

(2.) That when the water is first introduced into the pipes, there is more action on the pipes, as far as contamination of the water is concerned, than subsequently, but that after a few days' service the quantity of lead in the water is practically very small.

(3.) That there is always more lead in the water after it has stood for some hours in the pipes than when it is allowed to flow freely.

(4.) That when the water passes through a lead-lined tank it will be likely to contain in solution or suspension a more considerable quantity of lead salts, from the fact that the lead is corroded more rapidly on the sides of the tank at the surface of the water. Moreover, in such tanks there is generally a considerable extent of surface of contact between solder and the lead.

(5.) That in the introduction of water into the pipes, the first effect is the tarnishing of the brightness of the lead due to the formation of oxide or suboxide; that there begins to form, almost immediately, a coating consisting on the *outside* of a brown and, at first, rather loose deposit (the color of which is not due to iron-rust as is ordinarily supposed, but to organic matter), and *underneath* of a white deposit composed mainly of carbonate of lead; that this coating increases with time in firmness and also in thickness, but that the rate of increase is so slow that practically the pipes used for conveying *cold* water, do not wear out and become unserviceable except from some accidental circumstance, as the freezing of the water, or, as is often the case where the pipes are laid under ground, from corrosion from the outside or from a cause immediately to be mentioned. That, however, the pipes even under ordinary conditions would eventually wear out, I have no doubt, as there seems to be no limit to the action. I have indeed a specimen of a pipe which, being in contact with cold water only, for a period of fifteen years, was so corroded in the vicinity of a solder-joint as to be eaten through, and along the pipe there is a thick coating consisting almost entirely of carbonate of lead (with organic matter, a little carbonate and sulphate of lime and a trace of oxide of iron) which has penetrated the pipe in some places to the depth of 1-15 of an inch and more. There is one other circumstance contribut-

ing to the wear of cold-water pipes which is not to be overlooked. The water is delivered in many cases under such a pressure that the pipes tend continually to expand. The effect of this is often to strain the pipes so as to form longitudinal seams or grooves of greater or less length and the corrosion taking place under such favoring circumstances more rapidly, sometimes extends through the pipe, which is thus rendered unserviceable by a combination of chemical and mechanical action.

(6.) That pipes used to convey *hot* water are corroded more or less rapidly, a deposit similar to that in the cold-water pipes being formed, and the corrosion manifesting itself most decidedly in the vicinity of the solder points, and where the pipe is sharply bent. Whether the iron-rust, coming from the *water-backs* in which the water is heated, contributes to produce this effect, I am not prepared to say. The disarrangement of the particles of the lead and the change in its mechanical structure, brought about by the alternate and unequal contractions and expansions to which it is subjected, must present more favorable opportunity for the corrosive action due simply to the passage of the water through the pipes.

In connection with this report, I would present a list of the "literature of the subject," which, although not pretending to completeness, may be of service to any one interested in the matter.

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Buckler.—Amer. Jour. Sci. (2) XIV., (1852) p. 267.

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Respectfully submitted,

(Signed) WM. RIPLEY NICHOLS.

MASS. INSTITUTE OF TECHNOLOGY,
BOSTON, Oct. 20, 1870.

From the evidence presented in the preceding pages, it seems reasonable to believe that the use of lead pipe for the conveyance of drinking water is always attended with a certain degree of danger, because such water always contains lead; and that this danger varies in degree with the character of the water conveyed and the susceptibility to lead poison of those who drink it.

The chemist can say that water containing air (or natural water) always acts upon lead; but he cannot say that a certain kind of water will, under all circumstances, take up and convey

in solution, only a certain proportion of lead. The physician finds it equally impossible to say that a certain proportion of lead in water will hurt no one.

From these two shifting elements of difficulty come all the doubt and obscurity which have made the influence of lead-pipe-water a disputed question.

How much lead can we habitually take without injury? No one would voluntarily add it in ever so small amount to the water of the spring, well, or lake which supplies his drink, yet thousands and even hundreds of thousands of people in Massachusetts do constantly receive it in very minute amounts without manifest injury.

No well authenticated instance of lead poisoning from the Boston water has come to our knowledge, although lead pipe is almost universally used for its distribution. The same statement may be made as regards Charlestown and Worcester, and is doubtless true of other large cities and towns supplied by water works from lakes of great purity. We may conclude from experience and observation that the character of the water in these cities is such as to dissolve lead in so small amounts as to be generally harmless,—and we use the word "generally" advisedly, because although paralysis, and wrist-drop, and the most distinctive signs of saturation with lead have not been observed, it does not therefore follow that minor obscure ailments, particularly of the nervous system, have not been aggravated or even caused by this subtle poison. There are a great many cases of neuralgia, of (so-called) rheumatism, and of dyspepsia, whose causes are unknown.

When we see that Professor Nichols finds one-ninth of a grain of lead to the United States gallon (equal to one-eighth of a grain English gallon), in the hot-water pipes of a private house in Boston, and remember the possibility of such water being habitually used for cooking purposes, it is well to be cautious in giving it a good character under all circumstances.*

But if the lake water of the cities mentioned, is generally incapable of dissolving a dangerous proportion of lead, it is

* A case of lead poisoning recently occurred in the city of New York, which was traced to the use of Croton water (whose character has been thought safe), drawn from the hot-water pipes after standing in them all night. In this water "cracked wheat" was soaked every morning, preparatory to boiling.

equally certain that the water of springs and of wells is very often ready to dissolve an amount which will produce dangerous disease.

The chemical evidence already presented shows that it is so difficult as to be practically impossible to say, even when we know the constituents of the water, whether it will dissolve dangerous amounts of lead until it has been actually tried by domestic use and for considerable periods of time.

It is well that we should have some idea of what have been found to be dangerous amounts of lead for habitual use.

Dr. Angus Smith says that one-fortieth of a grain per gallon will affect some persons, while one-tenth of a grain may be required for others. Dr. Parkes, a high English authority, thinks that any quantity exceeding one-twentieth of a grain per gallon must be regarded as unsafe. These opinions are also held by Professor Graham, Dr. Taylor and other equally known chemists and physicians. Dr. Adams, of Waltham, reports a case of poisoning in which only one-hundredth of a grain per gallon was found in the water. In the celebrated case of the poisoning of the family of Louis Philippe by drinking water which had been stored in a lead tank, the amount of lead was seven-tenths of a grain per gallon. This quantity affected thirty-four per cent. of those who drank it.

The susceptibility of individuals to the action of poisons, whether metallic or non-metallic, is known to differ exceedingly. Many persons pass half their lives in ignorance of their own peculiarity in this respect, and then have revealed to them by some lucky accident that what to their neighbors has been harmless, has been to them for a long term of years the source of great discomfort or illness. In our reports from the towns it is evident that in numerous cases water containing lead in solution has been insidiously undermining the strength of people who never suspected the cause until some one of their family, still more susceptible to this peculiar poison, developed the signs of advanced lead disease. The minor degrees of illness from minute doses of lead must have been unrecognized in a great number of cases where no physician was consulted, and where, even if he had been, he might readily have failed to trace them to the use of water conveyed very likely in the

same way as that which he had himself used without any visible harm.

The only safe practice with water which has not been tested with lead pipe by long experience, is to use some other material than lead for its conveyance.

The only reason (and it is an excellent one as far as it goes), why lead pipe is so generally used for the distribution of water, is that it is cheap and convenient. Many substitutes have been proposed. Iron naturally suggests itself first, and, on the score of health, is quite free from objection, as minute doses of iron rust are harmless. One difficulty with iron is found in adapting it to the circuitous passages which domestic convenience requires it to traverse in our houses; another is found in the obstruction of the pipes by rusting. For conducting water from a spring in a direct line to the dwelling, it may be regarded, in spite of this latter objection, as practicable, cheap and safe. It has been said that the iron rust might render it unfit for washing white clothes, but this objection seems rather fanciful than real, as in all city houses supplied with hot water it is carried through an iron water-back behind the range, besides passing through miles of iron mains, without discoloration.

For use in wells or for conducting water from springs, tubes of wood have been proved by long experience to be generally good and wholesome. It has been thought that water containing sulphate of lime sometimes acquired a flavor of sulphuretted hydrogen from its passage through decaying wood. It is certainly a perishable material, but so is lead, and the latter by dangerous corrosion. We are inclined to believe that, generally, wood will last longer than lead.

To obviate the inconvenience and obstruction caused by rusting, the (so-called) "galvanized iron" is often used. This is prepared by passing iron pipes, cleaned by dilute acid, through a bath of molten zinc.* It is claimed that the whole character of the metal is thus changed, and the zinc does actually seem to soak in, in certain cases. But the quality of

* It has been said that zinc (as well as lead) may impart a poisonous quality to water conducted through it. This is not proved, nor is it very probable. The question is discussed by Dr. Winsor, of Winchester, in the Boston Med. and Surg. Journal, Jan. 5, 1871, and the conclusion reached that although carbonate of zinc may be found in water conveyed through galvanized iron pipes it is no more harmful than carbonate of iron.

the product varies, so that often the coating of zinc is only superficial, and sometimes the interior of the pipe is not completely covered. There can be no doubt that this zinc covering preserves the iron from rusting for a certain time, varying with the quality of the pipe.*

Gutta-percha pipes are sometimes used in wells and would seem to be excellent for this purpose, but it is questionable whether they will bear the pressure of the water-works of Boston.

Pure block-tin pipes are excellent on the score of health, as the oxide of tin is insoluble, but they are rather expensive for general use.†

Quite recently much use has been made of lead pipe lined with tin. This material is sufficiently flexible to be carried anywhere, and is not expensive. It has been longer used in England than in this country, and is there highly commended and on good authority. Nevertheless, it would seem difficult, if not impossible, to entirely prevent in this way contact between lead and water, and when it does take place, the corrosive action would be rather hastened by the presence of the other metal. Time alone can prove the value of lead lined with tin, and it is yet new.‡

The same may be said of the seamless brass tubing now being introduced, to save the expense of repairs, in a good many places. For drinking water it must be looked upon with suspicion.

Glass tubes, and iron lined with glass have sometimes been used, and seem to answer every condition required by health; but, as in so many other things, health, convenience and economy cannot in this way be combined.

* See Mallet, in report of British Association for 1840.

† Block-tin pipes are rapidly corroded underground, and should be protected in some way from the action of the soil when used under such circumstances.

‡ Since the above was written we hear on good authority of some tin-lined lead pipe being removed after being in use two years at Roxbury Highlands, and found perfectly uninjured and even bright on its internal surface.

TRICHINA DISEASE IN MASSACHUSETTS.

TRICHINA DISEASE IN MASSACHUSETTS.

There have been two recognized outbreaks of this preventable disease in 1870; one in Saxonville, and the other in Lowell.

The discovery of this strange and terrible cause of sickness and death is an excellent illustration of the progress of science, of the use of the microscope, and of exact and careful observation. Here is a disease which we have every reason to believe has existed among men as long as they have eaten pork, which has killed or made sick thousands upon thousands of people, and yet whose nature and whose cause no man suspected until within a very few years. The first glimmer of light concerning it was perceived in 1832, but since 1860 it stands clearly revealed through the labors of physicians and microscopists all over the world, so that to day it is one of the diseases most completely understood. Its history, its causes as occurring in man, and the means of avoiding it are now plain and intelligible. Trichinous pork is the flesh of a pig containing, imbedded in its substance, very minute living worms of a peculiar kind, invisible to the naked eye, each coiled up in a snug little oval capsule. The pig having this parasite in its muscles may be, and often is at the time of killing in apparent health. He may have been well cared for, and there may be absolutely nothing in his condition or in his surroundings to excite the least suspicion. This was true of the Tewksbury pig which caused such suffering to the family at Lowell in the present year. Yet whoever eats the smallest morsel of the lean meat of the animal without first killing the parasite, becomes surely affected with one of the most painful and terrible, although fortunately not one of the most fatal of diseases.

The parasites on being swallowed by man are quickly freed from their capsular envelope, multiply with immense rapidity,

and in three or four days the intestine swarms with the young trichinæ or flesh worms. They then set out on their travels, piercing the walls of the intestine, and boring their way through all intervening tissues, they proceed to establish themselves in the muscles (the red flesh) of the whole body. No muscles, except those of involuntary motion, escape their presence.

It is as if myriads of needles were being thrust through the flesh of the unhappy subject. The great muscles of the extremities and of the trunk of the body, the little muscles concerned in turning the eye, all, big and little, are invaded by these worms. The whole body is alive with them. Their number is so great that a minute fragment of flesh placed under the microscope reveals scores of them pushing their way through the muscular fibres.

Finally, in the course of about four weeks if the patient survives the suffering and the disturbance of vital functions, the worms all find the home they have sought, the promised land of the red voluntary muscle, and there they coil themselves up, become encysted or encapsuled, as originally found in the flesh of the pig, are dormant, comparatively harmless, and in the course of years die, and are changed into a chalky material which remains ever after in the muscle, weakening its structure somewhat, but apparently doing no great subsequent harm. In this condition they are not very infrequently observed in the bodies of those who have died from other diseases.

The writer has now in his possession a piece of dried flesh taken from a dissecting-room subject many years ago, and which has the appearance of being finely dusted with a grayish powder. On microscopic examination each of these minute points is seen to be a trichinous capsule converted into a cretaceous material.

The symptoms of trichina disease ordinarily observed are as follows:—

1st.—Feverishness, loss of appetite and of strength. Sudden swelling of the face, particularly about the eyelids, but without pain; copious perspirations.

2d.—Swelling of the muscles all over the body; every movement is now attended with severe pain; the muscles are also sensitive when touched.

3d.—Contraction of the flexor muscles of the legs, arms, and trunk, so that the patient lies drawn up, and upon his side;

swelling of a dropsical character, affecting the feet, legs, thighs and trunk. This order of signs marks the disease, and occurs in no other. There is usually diarrhœa, but not always. The prostration and febrile action bear a certain resemblance to typhoid fever, with which trichina disease has no doubt been confounded in previous generations before the flesh worm was seen.

The cases occurring in Massachusetts during the past year were under the care of Dr. G. S. Eddy of Saxonville, and Dr. Joel Spalding of Lowell, and we are indebted to these gentlemen for the following details. The Lowell cases were also seen by the writer on the 9th of April.

A family in Saxonville consisting of six persons partook of a dinner of fried fresh pork on the 8th of February, 1870. It was the only fresh pork used in the family during three months, with one exception. A portion of the meat was underdone, and the member of the family who ate the red and imperfectly cooked pork suffered most. Three escaped entirely, and three were affected on or about the 15th of February with the following symptoms.

Very marked lameness, soreness and stiffness of the voluntary muscles, more especially those of the calf of the leg. This muscular pain was the first sign in all these cases, and the most distinctive sign throughout. All three, however, had swelling of the face and of the feet.

The youngest, a boy of fourteen, after an illness of four weeks, during a portion of which period he had diarrhœa, entirely recovered.

His sister, two years older, was more seriously affected. For ten weeks she was confined to her bed, most of the time unable to lift hand or foot, and the lightest touch causing excessive pain. During this time there was no diarrhœa, and no marked increase of temperture, but an extremely rapid and weak pulse. Appetite voracious. No gastric disturbance. On the 16th of May she was just able to move about the house with muscles impaired, but daily improving.

The case of the eldest, a young man of 19, assumed about the third week, the general appearance of typhoid fever. Extreme depression, abdominal tenderness, diarrhœa, bleeding from the nose, pulse 150, finally, coma and death on the 12th of March.

Portions of muscle taken after death from the arm, thigh and calf of the leg proved to be swarming with living trichinæ.

No portion of the pork could be obtained for examination, nor could any history of the pig be got from the butcher who sold it. He was somewhat incensed by the subsequent small demand for fresh pork in the neighborhood, and declined giving any information.

The trichina disease was communicated to a family in Lowell in February and March, 1870, through a smoked ham from a pig raised by a Tewksbury farmer. It was one of an apparently reputable litter, had been well kept, and exhibited no sign of disease during its life. The ham and some of the salted middlings from this pig were delivered to the family in Lowell on or about January 20th.

The family consisted of father, mother and six children.

The two youngest children ate none of it. The father ate some of it slightly cooked, and the rest of the family ate it *raw*, cut in thin slices like smoked beef.

It seems to have been used as a sort of relish, eaten with bread, and portions of it remained in existence and were examined under the microscope as late as April 1st. The infection was thus received in small portions and at considerable intervals by different members of the family, except in the case of a girl of sixteen who had been absent and returned home on the 3d of March.

The first signs observed in all these cases except one, were those of an ordinary cold. Weakness, loss of appetite, shivering, and irritation about the air-passages.

The daughter declared that her first indication of illness was swelling about the eyes. In a few days muscular pains succeeded in all the cases.

Then stiffness and contraction of the muscles, swelling of the feet and of various parts of the body. In all there was great prostration of strength, and a rapid pulse. There was diarrhœa in three of the six cases.

On the 9th of April all were able to be on their feet except a boy of 11, who laid on his side with the body bent, arms and legs strongly flexed, complaining of great pain on being touched, with a rapid pulse and an expression of great suffering. He

was quite unable to extend his body or extremities, but had a voracious appetite, and subsequently recovered entirely.

The daughter of 16 had the complexion and facial expression of Bright's disease, and walked across the room stiffly, without being able to touch her heels to the ground, like a person under the influence of strychnia. She was improving daily.

The fragments of ham which were sought for by Dr. Spalding early in his attendance on these singular cases, and which fortunately remained, were found to be filled with living trichinæ.

The salt pork from the same pig was also crowded with them in perfect form and shape, each curled up in its little cyst, but probably killed by the pickle.

The *prevention* of this pork flesh-worm disease is entirely within our power, and depends upon the following well ascertained facts. Although the vitality of the trichina is maintained for years in the muscle of either man or pig, ready to become active and to reproduce its like on being transferred to the intestine of another animal, its life is completely destroyed by thorough cooking. A temperature of 150 to 160 degrees Fahrenheit is fatal to it.

Pickling may and probably does render the pork harmless.

Smoking (except at a very high temperature) certainly does not, as we see in the Lowell cases and many similar ones in different parts of the world. In some parts of Germany, where much uncooked pork is eaten in the form of sausages and ham, there are government inspectors to examine with the microscope portions of every pig offered for sale. This of course would be quite impracticable with us, and is indeed unnecessary anywhere if people will understand the all-important fact that uncooked pork muscle, that is to say the *lean* portion, (for trichinæ are not harbored in the fat) can never be eaten with safety. It should not only be cooked, but fresh pork, whether spare-rib or sausage, should be cooked so thoroughly that all redness has disappeared from it, and smoked pork should be boiled at least two or three hours. If a temperature of 160 degrees has reached the interior portions we may eat it without fear of trichina disease.

HEALTH OF TOWNS.

HEALTH OF TOWNS.

REPLIES OF CORRESPONDENTS TO INQUIRIES CONCERNING THE PROBABLE CAUSE OF SUCH DISEASES AS ARE SPECIALLY PREVALENT IN MASSACHUSETTS.

In our Circular of April 8, 1870, the following questions were asked:—

1st. Is there any disease, or are there any diseases which seem to be specially prevalent in your town, or in the region in which you practise?

2d. If so, will you do us the favor to state what they are?

3d. Can you account for this special prevalence, and is it, in your opinion, removable in any degree?

These questions will be seen to cover an immense field. They were proposed in order that some general idea might be formed of the extent and value of the materials at our command, and in the belief that a comparison of the replies would furnish a guide for more direct inquiries in all parts of the State, as well as for the study of the causes of local disease in the various towns.

These expectations have been fulfilled. Although a very large majority of the answers received have been mere negations, there is a valuable remainder in which will be found facts of the greatest interest, and many speculations and suggestions founded upon daily observation, sometimes extending over a very long term of years.

Physicians, as a class, are not communicative. They neither talk nor write much. In the smaller towns they but rarely have opportunity of communicating freely with each other, and except in the occasional meetings of the District Medical Societies, or in consultation, each goes his own way. Even in the

larger towns and cities where physicians are numerous, although, as everywhere in the civilized world, the knowledge of each is the common property of the profession, there is but little talk upon the causes of disease.

But if physicians say little and print almost nothing on these obscure subjects, it is certain that they think a great deal. In the course of his long and weary rides about the country, the Doctor ponders and speculates upon the causes of what it is the business of his life to contend with.

Why does that particular farm-house have fever or dysentery among its occupants every year in a certain month?

How is it that three or four different families who have lived in a certain house within my recollection have become consumptive?

Why does a certain hill, or ledge, or swamp, or clay bottom prove fatal to three times as many of its inhabitants as another locality within a mile of it?

Do as many people die of consumption now as thirty years ago when I began practice?

How has the temperance reform affected public health?

What change has taken place in the health of the people in this town since they left off going to sea and took to shoemaking?

Such questions are suggested by daily experience, but have not often been answered in printed publications, or in any form through which other practitioners or the general public could use the knowledge thus gained for the general good of the community. Such information has for the most part been lost by the death of those who collected it.

The following extracts from letters received from physicians, chosen by the selectmen of towns in every part of the State, will show how deep is the interest which they feel in the study of the causes of disease; and we doubt not will give the medical profession still stronger claims than ever before to be regarded as the natural guardians of the public health.

The whole number of replies received to the Circular before referred to is one hundred and seventy-one. Of this number, one hundred and twenty say that no disease is specially prevalent in the town or region of their practice. Fifty-one designate

either a special disease or a class of diseases as specially prevalent, and they are thus divided: —

Respiratory organs,	20
Consumption,	15
Typhoid fever,	9
Disease of nervous system,	2
Croup and pneumonia,	1
Dysentery,	1
Functional diseases of uterus, caused by use of sewing machines,	1
Cerebro-spinal meningitis,	1
Rheumatism,	1

Acushnet.—Consumption and typhoid fever are the most prevalent diseases, and seem to be influenced by easterly and southerly winds blowing across the Cape, and by a great deal of swampy land and stagnant water.

Amesbury.—"Lung diseases prevalent. The town, or rather its most thickly settled portion, is located about seven miles from the seacoast. To the west and northwest hills rise, leaving the village in a hollow, through which flows Powow River. We have strong east and northeast winds. A large portion of the Irish live in tenement houses built along the bank of the river, and but little raised above the high-tide level. In some localities and houses I think I have been right in attributing the frequent throat and lung difficulties to dampness of the house or part of the house occupied by the family."

Attleborough.—"Consumption is of frequent occurrence, but perhaps not disproportionately to other diseases. In every case of consumption seen during fifteen years I have found that ancestors in the direct or collateral line have died from it. I have met with some marked instances of arrested phthisis where the physical signs indicated the first stage of the disease. These cases have seemed to testify to the correctness of Niemeyer's theory. The disease has, under my observation, occurred in several instances twice or three times in the same house. In one case, where three persons have died within five years, the house, though large, open and well-exposed to air and light, is on a ridge between two swamps, neither of which is more than two or three hundred feet distant. I have

also learned that before my acquaintance, one or more cases of consumption occurred in the same house. In another place where there have been three deaths from this disease within my knowledge and another previously, the house is surrounded on three sides by low lands and on the east there is a high hill. The town is well elevated, but there is much undrained land and prevalent surface water."

Ashland.—Occupation of the inhabitants, boot-making, chiefly; the usual number of mechanics of other classes and a few farmers. The main village, on a level plain at the confluence of two streams and surrounded by hills. The soil is a sandy loam, with a yellow subsoil resting on a bed of gravel. The whole plain is full of water in the spring, but the natural drainage is excellent. From the lowness of this plain a stranger would suppose that Ashland must be an unhealthy town, but our correspondent thinks it above the average in respect of health. (For further remarks concerning the diseases prevalent here at certain times and places, see under the head of typhoid fever.)

Athol.—Air of lower village affected injuriously by stagnant water.

Brimfield.—"Pigsties and privies are the chief abominations of country dwellings, and will, in my opinion, continue to be a great cause of disease until the people are educated on this point. If they were properly attended to, there would be less sickness. I have in several instances directed the removal of piggeries which had been built close up to the dwelling."

Boston.—Our reply to the question concerning diseases specially prevalent may be found in another part of the present volume, under the head of "Analysis of the Mortality of the City of Boston." This information applies to the year 1870 alone. For a series of years the answer in general terms would be that the diseases most prevalent are those of infancy, and that they are dependent chiefly upon the impurity of air and of food.

Boston is blessed with an abundant supply of pure * water for rich and poor, and for this we cannot be too thankful. Vaccination has also been, for many years past, provided gratuitously for all who would avail themselves of it, and this, combined with the rule

* The qualifying statement should be added that lead, in minute amounts, is always found in the water when lead pipe is used for its conveyance.

that all children before entering the public schools shall produce evidence of vaccination, has kept small-pox under control. An inspection of milk is made by public authority, and with the best results. Public bathing-houses during the summer months have been established, and have proved of great value. All these are important provisions for public health, but they are only exceptions to the general rule of indifference to the general subject.

Boston has grown to be a great and crowded city, needing to avail itself of all the aid which modern science can furnish to prevent the origin and spread of disease, while its (so-called) health department is almost exclusively occupied in the direction of the city stables, and of the men and horses and carts connected with those establishments, and is seemingly without a care beyond the routine of scavenging, which is conducted on the same plan as when Boston was a town. When nuisances have grown to be unbearable by those exposed to their influence, and after repeated "complaints" have been made, an effort is made to suppress them; but there is no spirit of prevention, or of anticipation, and no sign of an intelligent appreciation of the consequences of sanitary neglect.

The legislature has provided laws framed to meet all our needs but they are not executed.

The deficiencies of the public service in these respects are set forth in the following document, which was presented to the Board of Aldermen in April, 1870, by the physicians who then accepted what they regarded as the responsible office of "Consulting Physicians of the City of Boston."

CITY OF BOSTON.

To the MAYOR AND ALDERMEN, *Health Commissioners of the City of Boston.*

The undersigned have recently received the honor of appointment as Consulting Physicians of the City of Boston.

Being desirous to understand at the outset the exact nature of our duties, application was made to the City Solicitor.

From that officer we learn that we are required to watch over the public health, and give timely warning of danger from any form of preventable disease, and that, failing to do this, we should not comply with the intention of the ordinance requiring our services.

This grave responsibility we accept, and in accordance with its obligations beg leave respectfully to make the following statements.

The death-rate of Boston has been for some years past so high as to excite the attention of the medical profession.

With natural advantages for drainage and ventilation equalled by very few cities in the world, and with an abundant supply of pure water, there is still

an average annual mortality of between twenty-four and twenty-five to the thousand of population.

During the past ten years the chance of living has been not quite as good in our City of Boston, almost surrounded by the sea, with a population of 200,000, as in London, on the Thames, with a population of 3,000,000.

The greater vital depression caused by want and misery in that most vast of modern cities seems to have been more than counteracted by the careful protection of public health.

Comparing the mortality of Boston with that of other parts of the State, the indications are also very unfavorable.

Half of the people of Massachusetts live in districts where the annual mortality does not exceed seventeen or eighteen to the thousand.

In 1868, the last year of which the records are published, four hundred and eighty-seven deaths from cholera infantum occurred in Suffolk county, while in an equal population outside of city limits the number was less than one hundred. The mortality from all bowel diseases of children is in similar proportion in Boston and in the country.

There are causes for this excessive mortality, and it is our duty to try to discover what they are, and if possible to point the way for their removal.

Among the first requirements for public health in a crowded city are sewerage and pavement,—such sewers as will cause all the foul liquids to flow away by force of gravity, and such pavement as will prevent all soakage into the soil.

To obtain these in perfection is a work of time, of great cost, and of the highest engineering skill; we cannot hope to have them changed except by slow degrees, and by such processes as have for many years been going on in Boston with public approval.

But there are other means of protecting public health easily reached, and whose benefits might be at once enjoyed by the citizens, to which we would invite your attention, as we deem them to be of great importance.

Our streets are not clean. It is perhaps unfortunate for sanitary progress in Boston that comparison in this respect with New York is so readily made. We return from that city congratulating ourselves on the superior cleanliness of Boston streets, which no one can question, but sometimes forgetting that the standard of comparison is a very low one.

The Metropolitan Board of Health of the city of New York have already accomplished a sanitary work from which other great cities may learn many useful lessons.

They have reformed the tenement-houses, suppressed dangerous epidemics, cleaned and disinfected the vaults, and removed or regulated all offensive trades; but the streets have been always entirely beyond their control, and the Board of Health are not in the least degree responsible for their condition. Street-cleaning in New York is a corporation job.

There can be no doubt that, in so far as the streets are concerned, New York is the most filthy great city in the civilized world. Our standard of comparison should be the streets of the great cities of Europe, which are as

much cleaner than the streets of Boston, as ours are cleaner than those of New York,

The dirt of the streets of Boston is made up, in great part, of the excrement of horses. This is allowed to accumulate, being alternately dried by the sun and air and soaked by the rains and watering carts, until it forms a foul and dangerous compost, tending directly, through the air with which it is in contact, to the production of disease. The interests of public health require that it be removed with much greater frequency than is now practised. We are of opinion that, during the summer and early autumn, every street in the city should be cleaned once in twenty-four hours, and the great thoroughfares by night.

There are, in all parts of Boston, filthy back-yards, alleys and passage-ways, broken-down and overflowing vaults, and, in the older portions, disused wells and cisterns, which are receptacles for dirt. All these nuisances should be reformed.

Offensive trades, like fat-melting and bone-boiling, are carried on in open vats in the midst of a crowded population. They should be compelled to use methods, tried and approved in New York, by which the sickening vapors may be entirely consumed. The authority to control these trades is given by statute.

House-offal, or swill, is allowed to become putrid before removal from the houses of the citizens. The offal is a source of profit, being kept by special ordinance free from mixture with ashes, which would tend to prevent its becoming offensive; but this enforced division of refuse material makes it the more obligatory upon the city authorities to take the dangerous portion away before it undergoes decomposition.

In our opinion public health requires that house-offal should be removed, in summer and early autumn, every day from every house.

Our tenement-houses are in a condition discreditable to a civilized community. It is only necessary to visit Friend Street Court, or the "Crystal Palace," in Lincoln Street, for any citizen to see under what desperate circumstances the occupants of these and hundreds of other similar houses are compelled to live. Their rents are enormous, and their condition calls for the relief which the legislature of 1868 intended to afford them through the Tenement-House Law.

This law has been a dead letter, but the interests of public health require that it be enforced without delay.

It is now no one's duty to inspect the fresh provisions offered for sale in Boston, while the law provides for the destruction of all which are unsound, and of all meat of any calf killed when less than four weeks old. We believe that public health requires the enforcement of these laws, and we would respectfully suggest that a systematic inspection of meats, fish, vegetables and fruits be made by city authority in a manner similar to the inspection of milk, which has proved to be so useful.

We think that all the reforms to which we have referred are practicable.

They concern every citizen, whether he may chance to live in a good home, with apparently wholesome surroundings, or in the most wretched ten-

ement-house; for no one can escape the general influence of the sanitary condition of the city in which he dwells.

These reforms would require an outlay of money, but we believe they would prove to be good investments, and that a true economy demands them.

The money value of human life to a community is real. A destructive epidemic is expensive. Moreover, a clean and unquestionably healthy city, such as Boston might be made, would have attractions for permanent residents and transient visitors which could not fail to favorably affect its commercial interests.

It might also well be an object of pride with every citizen to furnish in Boston an example of public cleanliness and public health which other American cities would imitate.

Very respectfully, your obedient servants,

HENRY BARTLETT,
GEORGE DERBY,
JAMES C. WHITE,
WILLIAM READ,
P. P. INGALLS,
Consulting Physicians of the City of Boston.

Boston, April 14, 1870.

As the season approached when cholera infantum and the bowel diseases of children were certain to commit great havoc in and around the filthy localities in which Boston abounds, the State Board of Health called the attention of the city authorities to their unwarrantable neglect of a law of the State in a letter which may be found in the general report of the Board.

These remonstrances have produced no visible effect. Instead of improvement there has rather been a progressive deterioration during the past year; a gradual lowering of the standard of municipal cleanliness, such as has been going on for many years through the growth of population, and the inertia of the health department fixed in its old traditions.

The streets are still very dirty, the alleys and passage-ways and back-yards often filthy, the vaults still broken and overflowing, the air of crowded neighborhoods made sickening by bone-boiling and fat-melting.

House-offal is still a nuisance in all parts of the city by being kept until putrid during the warm season.

Unsound provisions, both meat and vegetables, are freely sold, and, as it is nobody's business to enforce the law on this subject, it is a dead letter.

The tenement-houses of Boston, the houses in which the most impoverished and unhappy portion of our fellow-citizens are crowded

together, are a disgrace to our civilization. Through their squalor and wretchedness they foster crime as well as disease. Moral and physical health must equally suffer under their shadow.

The rent extorted from their unfortunate tenants, often through middle-men who have great rapacity and little feeling, is far larger in proportion to what they get in return than is paid by the prosperous. A single room, fifteen feet by ten, sunless and damp, unfurnished and entirely out of repair, brings $1.25 to $1.50 a week, or the interest of $1,000. Two rooms, fairly above ground, but equally squalid in all other respects, bring double this sum. All such premises are at the present time crowded to overflowing at the above rates. Often twenty families may be found using the same privy, filthy and repulsive in condition. Nowhere in these houses can the slightest evidence be seen to-day of the existence of a law of the State passed in 1868 for their regulation, and whose execution is vested exclusively in the Board of Health of the city of Boston.

Lest the above statements concerning the dwellings of the very poor should be regarded as exaggerations, the following list is given of places visited by the Secretary of the State Board of Health in November and December, 1870, and which justify the description:—

NOTE.—Where numbers are not given, reference is intended to the general character of houses in the street or court.

Stone's Yard, 100 Cross Street.
105 and 107 Cross Street.
Young's Court, rear of 124 North Street.
Mechanic Court.
Blind Alley, rear 209 North Street.
Land's Court.
Rear of 324 North Street.
Stone's Alley, Stillman Street.
Cook's Court, rear 390 Commercial Street.
Holden Court, rear 398 Commercial Street.
Commercial Court.
Basements in Pond Street Place.
Institute Avenue.
Basement of No. 8 Morton Place.
Crystal Palace, Lincoln Street.
Utica Street.
Cove Place.
Shaving Street.
Rear of 147 Kneeland Street.
128 Kneeland Street.

Cove Street.
Rear 298 Federal Street, extending around to Shaving Street.
137 Beach Street.
Federal Place, rear of 235 Federal Street.
Belmont Barracks, Broad Street.
116 Broad Street.
Wharf Street.
Rear of 155 and 157 Federal Street.
Holden Place.
62 and 72 Joy Street.
Stanhope Place.
Rear of 42 and 44 Phillips Street.
Southac Place.
Wilberforce Place.
Lee Place.
Lindall Alley.
Adams Place.
Barton Street (57 and 59) and Short Napier Street.
Parts of Billerica and Nashua Streets.
28 and 30 Lancaster Street.
126 Merrimack Street.
Alley leading from 132 Merrimack Street.
Parts of South Margin Street.
Rear of 67 Pitts Street.
Rear of 71 and 75 Pitts Street.
Yard and privies of 91 Merrimack Street.
47 and 53 Portland Street.
Alden Court.
Doherty Court, East Boston.
Rear of 107 Everett Street.
Second Street, (S. Boston,) south side, from Athens Street to No. 49.
Green's Alley.
Dungarvin Block.
Boston Wharf.
Athens Street from Second to A.
Slate House, corner Third and B.
Dewarson's Block, Silver Street, corner of C.
Silver Street, between B and C.
Buckley's Block.
Old Colony Block.
Parts of Ontario Street.
Parts of Rochester Street.

In evidence of the want of prevision of nuisances, of the complete neglect of their formative stage, when they might be prevented, of the indifference which permits their establishment, or of the ignorance which fails to see in advance the results to which they must

certainly lead, we would call attention to a hotel or lodging-house of seventy rooms at 44 Portland Street, built in 1870. At least, half of the whole number of bed-rooms have no windows, and are on both sides of long passage-ways only four feet wide. The rooms are in dimensions about ten feet by eight, and are absolutely dark, so that you cannot see the opposite wall without lighting the gas, and have their only supply of air through the narrow passage-way into which the doors lead. All this, of course, is in direct violation of the Tenement-House Law of 1868.

Blackstone.—"The diseases most prevalent are those of the lungs and inflammations of the mucous membranes generally. The mortality among our foreign population is large, more particularly among children. Very much sickness can be traced to a want of proper sewerage and the neglect of cleanliness and ventilation."

Barnstable.—Pulmonary affections very common, accounted for, in part, by exposed position of the town, moist atmosphere, fogs, cold winds from the sea.

Billerica.—"Vaccination and re-vaccination have been grossly neglected in this town, and if smallpox were to break out to-day, not more than five per cent. of the inhabitants would be suitably protected by vaccination."

Barre.—Locality favored with great natural sanitary advantages. No disease more likely to prevail here in the future than smallpox, when once imported. People are very negligent about vaccination.

Brookline.—Our correspondent informs us that there are in Brookline three or four filthy localities occupied by foreigners, and where the houses are crowded with people who pay no regard to cleanliness; their slops and refuse are for the most part thrown upon the ground—their pigsties are offensive. In contrast with all this, we know that the greater portion of the people of Brookline enjoy all the comforts of life, and there is, perhaps, no town in the State where so large a number are in possession of all which may be supposed to promote health and long life—beautiful estates are to be found throughout its territory. Our correspondent finds, as between these two classes of inhabitants, quite as much sickness among the rich as among the poor—quite as large a proportion of illness among the Americans as among the Irish. He

writes as follows: "I have concluded, in considering the comparative amounts of sickness among those who have comfortable houses and those who live in crowded quarters, that the habit of living out of doors day and evening in the summer, which prevails among the latter class, acts as a preventive of disease.* The gross amount of deaths in the poorer class is not an indication of the comparative amount of sickness with that class, but only a proof that, owing to a want of good nursing and good care, a larger number of fatal cases occur than among the wealthier classes. With regard to our epidemics of scarlet fever, I have noticed that they are at times confined to the population in the poorer neighborhoods and at other times to the wealthier class, thus agreeing with the idea that the disease does not, as commonly expressed, 'come in the air,' but is conveyed by contagion. For instance, this autumn the inhabitants of Pearl Place and of Fairmount, two locations occupied by the laboring class, the one on the marsh, the other a mile away, high and well ventilated, both suffered with scarlet fever of a malignant type, and causing many deaths, while there were only one or two cases in other parts of the town." (See further remarks under the head of Typhoid.)

Berkley.—Bronchial diseases seem to be most prevalent. Their cause obscure. Soil rather low and wet, not very pervious to water. A good deal of easterly wind.

Concord.—"Cases of consumption, of rheumatism and neuralgia are of frequent occurrence. The Concord River is a very sluggish stream, having less than three feet fall in twenty miles. There are extensive wet meadows on its borders, subject to be overflowed two to four times a year, and to remain saturated with water several weeks at each overflow. Early after the settlement of the country, permission was given to build a dam over this stream at North Billerica. Near the close of the last century this dam was raised to facilitate the operations of the Middlesex Canal, and since then the meadows have been growing worse, and remain saturated a longer time. Some twenty years ago, the old mill and dam passed into the hands of a manufacturing company which has raised the dam still more, and aggravated the difficulty. There is upon the borders of these meadows, for twenty miles or more, a damp, chilly atmosphere for considerable portions of the year, which may be supposed to account for many cases of consumption and rheumatism. We

* In the absence of weather-strips, double-windows, and furnaces, do they not also get more fresh air in winter?—SEC'Y.

once got an Act of the legislature requiring the reduction of the dam, but the manufacturing interests of the State combined and repealed the Act the next year, and thus several hundred thousand dollars worth of property has been destroyed, and probably many lives lost, and much suffering endured to save two or three men the difference in the cost of running their works by water or by steam."

(From a non-medical correspondent comes the following.) "This excellent old town has been settled two hundred and thirty-five years, and in point of education and general civilization may fairly be claimed to be the equal of any town in the State. It is a quiet, agricultural town with no such press of business as to prevent the citizens from taking the best care of themselves, and no such multitude of children that they may not be taken proper care of. Indeed, in one school district where there was formerly a large school, of late there have been too few children to form a quorum, and the school has been discontinued.

"The houses are nearly all old, and have been occupied for a half century or more. We see therefore that there has been time enough to get things into comfortable order, and I do not know why we may not fairly presume that Concord, as to its provisions for drainage and ventilation, is as well provided as most other towns. Now for the facts. A High School was finished for occupation about a year ago, at a cost of twelve thousand dollars and more, under the direction of a committee of some of our best citizens, and there is not yet the slightest pretence of any ventilation, except by opening the windows.

"When the matter was discussed at our recent town meeting, the only reason given for not providing ventilation for that school-house was that, of the nine other school-houses in town, none of them had any better means of ventilation, and that it was very expensive to ventilate, any way. The town however voted to begin their ventilation of school-houses at once with the new building.

"The absences from schools in Concord from illness have been, during the past winter, very great, and I have no doubt that want of ventilation was the cause of much sickness and loss of progress in the classes. So much for ventilation.

"Now as to drainage. To-day (April 21, 1870), probably one-half and more of the houses between the railway station and the Soldiers' monument, comprising the most substantial and compact part of the village for half a mile on the two principal streets, and two or three cross streets, have the bottom of their cellars covered with water to various depths, from a few inches to two feet. There is no pretence of any drainage to these cellars. The plain fills with

water in the spring, and it rises in the cellars. The old casks, and tubs, and planks, and vegetables, and dead rats and other nameless horrors, float and soak and exhale their aromas.

"The furnace fires are drowned, and the oldest inhabitants are very much surprised, as they have been for a century or two, at the wetness of the season.

"When I bought my house three years ago, I drained it with tiles 240 feet across the road, at a cost of less than $25, and it is now perfectly dry. It had been occupied seventy-five years, with a foot or two of water in the cellar once in two or three years during the spring."

Chicopee.—Our correspondent sends a drawing, showing the position of the town and the central village, with reference to the rivers which bound it on two sides. On the other sides are hills abounding in springs. Both the air and soil are unusually damp. He says: "From the location of the town, the dampness of the soil, the many springs running to the rivers, it might be expected that diseases of the lungs and throat would be prevalent, and especially consumption; but, after careful investigations and many inquiries, I find that these diseases are no more rife in Chicopee than on the highlands which stretch away on one side to the Berkshire hills, and on the other to those of Worcester county." Water is conveyed to the central village from neighboring springs, and is of great purity.

Coleraine.—"I think that erysipelatous diseases and fevers of the typhoidal type prevail in this region, and in the western part of the State generally, more than they do farther east. I think I have also observed a periodical element in various diseases which I refer to malarial influences. I cannot fully account for the prevalence of zymotic diseases, but I believe that increased knowledge of the conditions of health, and greater cleanliness in the neighborhood of farm buildings, with land drainage, will help much to prevent these diseases.

"The mill-ponds near our factory villages, I think render the air foul in times of drought."

Dennis.—Soil quite different on the two sides of the Cape at this point; on the south side, sandy; on the north side a stiff clay subsoil. There are several diseases which present different appearances, as our correspondent believes, from this circumstance. Scarlet fever is one of them, and is more fatal on the north side. Lung

fever prevails on the north side. Tobacco is doing much to shorten life. "There is another thing which should receive your attention. It is the intermarriage of relations. In this locality the effect is truly dreadful. There are, I think, more than fifty children of cousins who are either straight-out idiots or feeble-minded."

Dudley.—"Lung diseases are most prevalent here; pneumonia, pleurisy, bronchitis. I think that cases of consumption are rather more frequent than in adjoining towns. I cannot account for it unless it is from the wet soil. The subsoil is clay. Location, high and exposed to winds."

Essex.—Diseases of the air-passages; also, in a less degree, rheumatism. "There is but little doubt in my own mind that the prevalence of these diseases is dependent on the chilly, damp east winds which continue here a considerable portion of the year." Soil, clayey and rather impervious to water.

Fitchburg.—Purity of water supply from wells becoming questionable, from the increase of population. A reliance on the surface water not regarded as safe in the future. Wells and springs becoming gradually less pure.

The opinion is expressed that consumption is not less frequent now than formerly, and that the apparent diminution is due to more careful registration.

Falmouth.—Pulmonary affections very common, and the most probable cause found in heavy fogs and cold winds.

Fall River.—Consumption, catarrh, dyspepsia and nervous diseases are prevalent. The first two are due, in a certain degree, to the localities. The town is exposed to cold, damp fogs, and has a large body of fresh water on the east, and Narragansett Bay on the south-west. Soil wet and impervious to water. Consumption is very prevalent among the foreign population, who have not the slightest knowledge of hygienic laws, who live in a crowded condition in the midst of filth of all kinds, and sleep in poorly ventilated rooms. These conditions are perhaps even more conducive to consumption than the location of the city.

Groveland.—No prevalent disease since dysentery in 1866.

Gloucester.—"The atmosphere in spring and summer is sometimes

rendered exceedingly offensive by emanations from decaying fish, either thrown into the harbor or spread upon land as manure.

"I am not aware that any disease has been engendered by this contamination of the atmosphere, or that those prevalent at such seasons have been peculiarly aggravated."

Groton.—Influenza has been very prevalent from atmospheric changes. A prominent cause of consumption is the want of ventilation in houses. As soon as cold weather comes people shut up their houses as tight as possible, and then, with stoves, heat them to such a degree that they become very sensitive to cold on going out of doors.

Hanson.—"The region in which I practise is considered healthy and not subject to any special disease. There are, however, small localities where it might be expected that health would be affected; and indeed I think it is. Here fevers are more serious; scarlet fever is attended with more ulceration of the throat; common inflammation of the throat is more apt to pass to ulceration, and ill-turns are more frequent. These localities are low and wet, being near cedar swamps and marshes, and sometimes foggy. This cause affecting health cannot be removed, but only mitigated by proper care and management."

Hinsdale.—"Scarlet fever has been very prevalent and fatal in this town during the past year, and has been confined almost exclusively to the foreign residents, operatives in the mills. Why the disease should be restricted to this class of our population I cannot explain, unless it be from their crowded tenements and less cleanly habits."

Hingham.—Consumption a very common disease but not to be regarded as specially prevalent. "I do not notice that this disease appears with greater frequency near the harbor, which is a flat at low tide, or along a slow-flowing stream which runs through a low marsh, on the borders of which a portion of the town is built for over a mile, than in what is known as South Hingham, which lies on an elevated and well-drained plain."

Holmes' Hole.—Bronchial affections very common in winter and spring. The winters are open, with rain instead of snow, and a humid atmosphere. Much exposed to winds from north-east, east and south-east.

Hadley.—Cerebro-spinal meningitis has been frequently observed here. The cause entirely unknown. "The type of all disease is low, the nervous system showing great depression from apparently trivial influences. After ordinary colds, pleurisies, pneumonia, erysipelas, etc., there will be great depression, feebleness, sighing, tendency to nausea, etc.

"Six or seven years ago we had diphtheria very severely, and since have had more or less of it, but in a milder form. I know of no special agency in producing the tendency described." The soil not wet except during freshets. The air apparently pure. The houses *much* shaded.

Hudson.—"We have not been free from scarlet fever since the autumn of 1866. The site of the village is low, but with a dry and pervious soil. In the hot season the purity of the air is somewhat affected by decaying vegetation in surrounding ponds."

Hubbardston.—Our correspondent reports thirty persons living in this town who are over eighty years of age, including one aged ninety, two aged ninety-one, and one aged ninety-six. Population in 1865, 1,546.

Leominster.—No diseases specially prevalent during our correspondent's practice of thirty-two years. He believes that consumption is less destructive than it was a quarter of a century ago, and thinks it accounted for by improved methods of treatment, and by better sanitary regulations in families arising from greater intelligence concerning the causes of disease.

Lunenburg.—Our corrrespondent at Fitchburg sends us the following letter on the 31st December, 1870: "In the south-east corner of Lunenburg there is a reservoir pond covering about 1,000 acres, from which several mills are supplied in Shirley Village. Last summer and fall this pond was drawn unusually low,—never so low before. The pond is shallow, and a great amount of vegetable matter must have been exposed to the sun by this unusual drainage. Scarlet fever of a malignant type has prevailed on the borders of this pond and in Shirley Village, some three miles below, for several months past. I think, in a very sparse population, six deaths have occurred, and from those cases which I saw in consultation I think they died early from *blood-poison*, and not from anginose or local trouble. It has occurred to me that possibly a local influence, from decaying vegetation in that old drained reservoir, may have pre-

pared the '*nidus*' in these patients for an intense and malignant development of the specific germ of scarlatina. Or is it possible that the unknown 'entity' which produces scarlet fever may have a spontaneous generation in wet, decaying vegetable matter under the influence of a hot sun?"

Lexington.—"Situation quite high; soil generally dry. There is little or no stagnant water in the warm season. The air is pure except in so far as it is affected by four or five piggeries of some size, supported by slaughter-house offal and city swill."

Lenox.—Houses much shaded.

Lowell.—See remarks under the head of "Typhoid Fever."

Littleton.—Reference is made to slaughter-houses existing in the town which render the air of their neighborhood foul from decomposing animal matter.

Lynn.—Our correspondent, representing the opinions of the City Medical Society, replies that functional diseases of the uterus are of very common occurrence, and that this special prevalence is due to the use of sewing machines, run by foot-power.

We are also furnished with some interesting facts, reduced to tabular form, and designed to show the comparative healthfulness of two great divisions of the city, one of high land, the other of low land. The population of these sections in 1870 is obtained from the United States census in advance of publication. The comparison has been made by Dr. J. O. Webster, under the direction of the Lynn Medical Society.

TABLE I.

Showing the number of Deaths from the Diseases specified, in the City of Lynn for the years 1865-69, *inclusive, east of the line of Washington Street, excluding all doubtful cases.*

HIGHER SECTION OF THE CITY.

YEARS.	Consumption.	Typhoid Fever.	Dysentery.	Cholera Infantum.
1865, ...	44	14	17	9
1866, ...	37	12	13	13
1867, ...	41	7	–	16
1868, ...	48	3	–	13
1869, ...	46	9	4	18
Totals, . . .	216	45	34	69

TABLE II.

Showing the Deaths, as above, west of the line of Washington Street.

LOWER SECTION OF THE CITY.

YEARS.	Consumption.	Typhoid Fever.	Dysentery.	Cholera Infantum.
1865, ...	44	28	9	13
1866, ...	50	13	9	10
1867, ...	43	3	2	8
1868, ...	43	15	2	17
1869, ...	54	11	1	14
Totals, . . .	234	70	23	62

Population of the north-east or highland section,—

1865, ... 11,731
1870, ... 16,710

Population of the south-west or lowland section,—

1865, ... 9,016
1870, ... 11,521

Mean population of the north-east section, . . 14,220
Mean population of the south-west section, . . 10,268

In 1865, the deaths from consumption were, in the north-east section 3.75 in 1,000 of population; in the south-west section 4.86 in 1,000. In the same year the deaths from typhoid were,—in the north-east section 1.19 in 1,000; in the south-west section 3.10 in 1,000.

The average annual mortality in the five years 1865–1869, inclusive, from consumption was, in the north-east or highland section 3.03 in 1,000 of mean population; in the south-west or lowland section 4.55 in 1,000.

Same years, from typhoid fever in north-east or highland section, 0.63 in 1,000; in south-west or lowland section, 1.36 in 1,000.

The percentages of dysentery are very nearly alike in the two sections, while cholera infantum shows only a slight preponderance on the side of the south-west or lowland section.

Middleton.—The town is hilly and of generally uneven surface, but there are long tracks of meadow on which grows a coarse grass. These meadows are sometimes covered with water, and are always

wet. The banks of the Ipswich River are also frequently overflowed. There are no unhealthy exhalations from these meadows, river-banks, nor from the ponds. Soil loamy and gravelly. There are now living in this town forty persons between the ages of 70 and 92. Population in 1865, 922.

Nahant.—Our correspondent reports a severe epidemic of whooping-cough during the summer of 1870, but no diseases specially prevalent in a series of years.

Nantucket.—Neuralgia, rheumatism, catarrh and lung affections the most common ailments, and influenced apparently by cold and dampness in the winter and spring. Not removable.

Northborough.—"No diseases especially prevalent. During the past twenty years dysentery and scarlet fever have twice prevailed extensively, with a large number of fatal cases. I think we have very few cases of consumption, but there are two families, one in the west and the other in the south part of the town, where nearly all the members have been affected with this disease. Both houses are in certain respects alike, both are situated very low, and fronting a large expanse of low meadow land, which causes them to be very damp during most seasons of the year. This, it seems to me is the cause of the disease. I have a case in Boylston similarly situated, and in which I find the same cause."

North Adams.—Typhoid fever very common in the autumn. Tubercular diseases always, though less prevalent than formerly. Mountains and valleys seem equally exposed to both diseases. The town lies in a valley with mountains on the east and west sides; consequently there is less sunlight than in most places. Morning fogs were formerly very common, but of late years are rare. The cause of this change is unknown.

Newton Corner.—"No disease specially prevalent. Village composed almost entirely of well-to-do or wealthy people, who live in houses quite well ventilated, with plenty of room about them *now*. The matter of drainage will soon demand attention. Surface water is carried off quickly by brooks running into Charles River.

"Where there are water-closets no cess-pools are provided and the drainage is into the ground. In some parts of this village there is complaint of wet cellars at certain seasons. I have not, in such cases, noticed any more disease than in other and drier parts of the

town. Perhaps there is not so good a state of health, that is all. No standing water in any part of the village. Subsoil gravelly, or sand and clay."

Newton Centre.—"The only disease which has a marked prevalence is dysentery, and that is almost exclusively confined to a region south-west of this village bordering on an extensive peat swamp, and drained by a sluggish creek. A fatal epidemic of diphtheria prevailed in this same region six years ago."

New Salem and North Prescott.—Consumption is prevalent. In some measure it seems to be developed by working on palmleaf, an occupation which gives employment to a large number of females in this vicinity. In trimming the leaf there is much fine dust. Those who braid are constantly wetting the hat so that the leaf will not break; their fingers are, in this way, exposed to cold. These occupations are favorable to the development of consumption on account of sedentary habits and in-door life, as well as from exposure to dust, and to cold and wet hands. Other causes are found in the character of the soil which is rather a heavy loam, very stony, rather impervious to water, and with swamps in many localities. A large proportion of cases of consumption met with have been on high ground. Drainage of the soil is much to be desired.

Orleans.—Consumption prevalent; also typhoid fever. Soil generally dry and sandy, but few swamps or marshes (except salt marshes), but a great number of ponds of pure water with no natural outlet. Township nearly destitute of timber and much exposed to winds.

Provincetown.—Rheumatism a disease specially prevalent in this town, both inflammatory and chronic; affecting children as well as adults, women as well as men.

Plymouth.—"In the south part of the town, along the basin of a small river flowing into the sea, consumption is frequent. The soil is in this basin low and wet."

Pittsfield.—Houses too much shaded. [See under head of "Typhoid."]

Randolph.—Consumption is less fatal, and probably less frequent, in the past few years than previously, and is not now regarded as

specially prevalent. "It has not been observed by a majority of the physicians practising here that this disease affects preferably any particular districts. Nevertheless, it is the experience of one gentleman that in his neighborhood, swampy tracts of land have furnished more cases than dry, exposed upland."

Reading.—Consumption very prevalent. Our correspondent says: "I cannot account for this prevalence except from dampness, and this is only partially removable. Much of the land is low, level and wet, and much of the higher land is retentive of moisture. In spring many cellars are partially filled with water for a considerable time."

Rockport.—Our correspondent furnishes the following sketch of the climatic peculiarities of Cape Ann, and the diseases of that section of the State, derived from observation extending through thirty-three years of practice.

"The surface of Cape Ann, on the north-east extremity of which I am located, is mostly elevated and dry, rising on all sides towards the centre more or less abruptly, and varying from one to two hundred feet in height. It is thickly studded with boulders which were once part and parcel of the underlying granite, and which probably, as successive portions formed the coast, have been thrown up by the waves, and, along with the gravel and the sand, the products of their attrition and disintegration, constitute the greater part of the soil. There are portions of the Cape where, for acres, these boulders lie so close to each other that a man cannot thrust his foot to the earth between them, or a sheep, with nose ever so much sharpened, crop the herbage that ventures to spring up among them.

"There is comparatively little low, wet or boggy land, and from the character of the soil, there is little mud in wet weather, and, if allowance is made for the vast amount of teaming from the granite quarries, there is little dust in dry weather.

"Near the centre of the Cape is a clear and deep pond, between two and three miles in circumference, which furnishes a bountiful supply of ice in winter, and from which issue two fine brooklets running to the ocean, one across the north-western, and the other through the eastern part, passing through the centre of the village of Rockport.

"Springs of pure water are not unfrequent, though most of the water used for drinking and for culinary purposes is obtained from

wells. From whatever source, it is probably as free from impurities as in any part of the State.

"On the whole, when the materials of which the Cape is composed are considered, so little adapted to harbor the causes of disease, the diversified yet elevated landscape, and the thorough washings of the surface and stirrings of the air which the storms compel us to submit to, it must be regarded as most favorable in a sanitary point of view, in so far as these causes operate.

"The climate of Cape Ann may be said to be a little exaggeration of the climate of the New England coast generally. The Cape itself, being an island rather than a cape, is exposed to the full influence of the sea-breezes in all directions, and the summer's heat and winter's cold are tempered by them accordingly. A difference of five degrees I have often noticed between the extremes of cold reported at Worcester and by our thermometer. On the hottest day of the present season it reached ninety-four degrees. I believe it never rises above that point here, or falls lower than seven degrees below zero.

"As the water warms less rapidly that the land, in the early part of the season, and cools more slowly in the latter part, we are subject to damp and chilly winds from the ocean in the spring and early summer months, engendering a good proportion of rheumatic and catarrhal affections; while from July to December, we are repaid by the tempering of the extremes of heat and cold which render this Cape a pleasant abode for the invilid and pleasure-seeker. One striking effect of the tempering of the sea-air is the fact that in winter it often rains here, when a few miles inland it is snowing, and, as a consequence, there is good sleighing in the neighboring towns, when the Cape is bare.

"Another peculiarity, though from a different cause, is that in summer the showers seem to be 'balky.' A large area of the centre of the Cape is elevated, denuded of trees, and therefore, in the warm season, hot and dry. The heated air arising from this surface prevents the condensation of vapor above it, and in a dry season we are often tantalized with the prospect of a shower which has already refreshed our more fortunate neighbors, Essex and Manchester, the cloud rising and splitting just over our heads and passing over Massachusetts Bay on one side and Ipswich Bay on the other, and distributing its treasures where they are not wanted. Similar effects are observed at Cape Cod. I have been told by residents of that cape that it is no uncommon thing to witness a shower arise, and swing round the circle, replenishing the ocean on both sides with fresh water before a drop falls on the parched sand.

"The only disease that has been thought to be specially prevalent here is consumption, and it has been the fashion to attribute it to the prevalence of east winds. That in the spring and early summer months this cause, by producing catarrhal affections, may occasionally hurry on, in the predisposed, the disease in question, may be admitted, but a very large proportion of the cases I have witnessed here have been hereditary, or due to a predisposition generated in families by unfavorable hygienic influences, such as confinement in closed, small rooms, sedentary habits, intermarriages, neglected or mismanaged skin diseases, (a cause more fruitful than is usually supposed,) and an innutritious diet. Seldom has this disease entered a family without a number falling victims one after another of those who are usually most in contact with the sick, until large families have sometimes, from this cause, become nearly extinct. There is no doubt in my mind of the infectious nature of this disease, and, consequently, that there would be a great diminution of the mortality could those constitutionally predisposed be separated from the sick. An important fact bearing on the question of the influence of the sea-winds, and which seems to me decisive that they are made the scape-goat for violation of hygienic and social laws, is that while our best lands lie on the most easterly and exposed parts of the Cape, and our farmers are out in all weathers, not an instance has occurred of a farmer dying in consumption during my residence here, while repeated instances have occurred where the sons of farmers have left their father's employment, and becoming students, or entering into mercantile pursuits have fallen in the prime of life victims to this disease. Nor is this exemption confined to the period of one generation. Our oldest citizens inform me that they have no recollection of a farmer dying in consumption.

"The east wind bloweth where it listeth, and we cannot regulate the dampness thereof. If it is a cause it is an irremediable one; but if it is the chief cause here, it is a little remarkable that those most exposed to it should suffer least from the disease.

"With regard to other diseases, my experience has furnished nothing to lead me to think that they differ in character from those of the New England towns generally, especially of the towns on the coast."

[Remarks on typhoid fever and cognate diseases may be found under that division of our correspondence.]

Rehoboth.—Pulmonary affections most prevalent. The acute forms of these diseases occur during the breaking up of winter.

Consumption generally hereditary. The soil where it prevails is wet, impervious to water, and low in situation. Air rendered impure by stagnant water in large swamps. People persist in living in the worst parts of their houses, and where the sun does not come, and thereby do injury to their health.

Stow.—"In the lower portion of Assabet Village there were last autumn a good many cases of typhoid fever, and they were confined to that portion of the village which is built upon a meadow which has once been cut over for its peat, and left to fill up again. The builders have two modes of preparing their foundations for building upon this old peat flat. One is to dig out the mud for three or four feet and fill up with sand or gravel, on which they build their houses. The other is to drive spiles into the mud ten or twelve feet, and cover them over with stones and sand. They dig their wells in the mud-hole and use the water for drink and for culinary purposes. But this is not the whole story. They build their privies and pig-pens near their houses, and their sink drains add to the accumulated filth which is all mixed up with the water they use.

"From this swamp there is no proper drain. Right opposite this bog-hole is a pond belonging to the paper-mill, which is often drawn off during the night, exposing a surface covered with decaying vegetable matter, the odor from which is much complained of by those living near. Draining the swamp, which can be done without great cost, would contribute much to the health of the people who live upon or near it."

Southampton.—"Diseases of the respiratory organs are common in winter, and of the digestive organs in summer; and they both depend more upon the season than the locality."

South Hadley.—Diseases of the nervous system are much more prevalent during the past six or seven years than formerly, appearing to affect all ages. The cause is entirely unknown. No unfavorable conditions of earth or air discoverable.

[See Hadley for similar observations.]

Stoughton.—Our correspondent has practised in the town for forty years. He says: "Travelling westerly from the centre of this place, two miles, on a street where there are perhaps two hundred persons, I find the oldest of them is seventy. Going the same distance in the opposite direction there are about the same

number of people, but I find three couples all over eighty, and three widowers aged from eighty-one to eighty-five. I know of no essential differences in the situation, except that the land where the older persons live is considerably higher, and I should judge more pervious to water."

Stockbridge.—"In all this immediate vicinity, except on the hills which almost encircle us, there is a vast deal of moisture arising from the close proximity of the river, with abundant low grounds and frequent overflowings, on the south side, while to the north lies a flat marshy meadow at the foot of the hills.

"From these surroundings one would look for rampant consumption, if imbued with the doctrines of Dr. Bowditch on this subject, but while that scourge was at large among us years ago, we now see comparatively little of it, though catarrhal troubles are not infrequent. While our settlement is on very level ground, it is nevertheless a sort of knoll, with a porous, sandy soil,* through which water readily permeates to the meadows about us. The meadows on the north, I have thought, might be drained, and certainly should be, if possible.

"If any one characteristic of disease has shown itself more than another within the range of my practice, it has been a tendency to functional disturbance of the liver and of the digestive system, usually classed as biliousness. Some of these troubles I have been inclined to attribute to the great heat maintained in the dwellings. I have often found some of the foregoing difficulties almost incurable until I could induce the parties to keep a thermometer in their rooms and regulate them to a more temperate heat. Our streets and houses used to be very densely shaded, so that one could scarcely see some of the dwellings from the street. By incessant cryings out this state of things has been very essentially modified, and the people seem to be waking up to the possible utility of a little sunshine."

Somerville.—"This town has been represented as favorable to the development of consumption, but after a residence here of fifteen years, I do not find it to be so. On the contrary, I find less of this disease in proportion to the population than in Truro, Mass., which is dry and sandy, and where I practised medicine twenty years.

"Of our foreign population I will only say, that if there is any

* A noteworthy fact with reference to the relations existing between "soil moisture" and consumption.—SEC'Y.

bog-hole, they will get as nearly into it as possible, and they seem to thrive in the mud.

"Tobacco is doing much to undermine the constitutions of the people."

Shrewsbury.—Pulmonary diseases prevalent, and this owing to the general characteristics of the district: soil wet; tolerably pervious to water; great exposure to north and east winds.

Sutton.—Tubercular disease most prevalent. "My own opinion is that, in certain instances, it depends upon the character of the soil, and, in others, to proximity to streams and ponds, removable perhaps, partially, by extensive drainage. The situation is generally elevated and hilly, but the soil is for the most part heavy, impervious, or only partially pervious, to water; springy and wet quite late in the season; retains moisture on or near the surface a long time after rainfall.

"A small portion of the town has a soil differing very much from this; sandy, pervious, low or lying along the borders of streams or ponds. Very few wet meadows or swamps. Several ponds of clear water. Frequent fogs in the valleys and near streams."

Salem.—Consumption very prevalent, and due, in the opinion of our correspondent, to three causes, chiefly; 1st, the character of the soil; 2d, want of proper drainage; 3d, exposure to harsh winds.

"The soil in this city is, on one side, upon the surface a clay loam with a subsoil of damp, heavy clay, which is nearly impervious to water; on the other side, loam with a subsoil of sand very pervious to water. The city is bounded on three sides by tide water, and much exposed to harsh east winds. In one locality, where consumption is often met with, the ground is high and the soil gravelly; but on one side of this rising ground is a pond, the water of which during the summer becomes very stagnant, its emanations necessarily poisoning the air in the neighborhood. A portion of the city is made land, which was formerly a marsh. It seems to me that a thorough system of drainage would, in a measure, remove the unhealthy character of the soil; but the exposed position, the easterly winds, and the dampness which must necessarily arise from water on three sides, must always, I think, render this district the favorite seat of consumption."

Stoneham.—"Scarlet fever the only disease which seems to be

prevalent. For the past fifteen months it has been present. Cases of an extra severe type have occurred in well-to-do families as frequently as in those of the poor. Principal sanitary deficiency of the town is want of drainage. There are two tanneries. In the warm weather, the *open* drain connected with these establishments gives off very offensive gases. This drain is, in fact, the common sewer for a great part of the town, and many privies empty into it. It should be arched and covered over with earth."

[The Secretary can testify to the foul state of the ditch above referred to. Its condition has been the subject of fruitless litigation. It is certainly the duty of the town authorities to remove this nuisance before it occasions an outbreak of unmanageable disease.]

"In some boarding-houses in this town, six or eight persons occupy a small bedroom, and it is quite common to find four in one room, say thirteen by fourteen feet."

Taunton.—"Diseases of the respiratory organs have been unusually prevalent during the past winter and spring. The late autumn and early winter were comparatively mild, and were followed by a sudden change to cold and wet weather, which severely affected children and aged people. Many of our hale old men died in a very few days of congestion of the lungs; and many consumptives, who had been getting along tolerably, became exhausted and died.

"Tubercular affections are constantly under the care of our physicians.

"Taunton lies in a basin encircled by hills from one to three hundred feet high. This ridge is complete, except where the river causes a break. The Taunton River is tidal, emptying into Mount Hope Bay, seventeen miles below. Dense fogs roll up from the sea at times, and are retained in this basin, alternating with easterly winds. The land is swampy, and the drainage very imperfect. The city is built on the banks of the river, and when the tide is out the surface of the water is not more than four or five feet below the adjoining land. All the houses are built with cellars six or seven feet below the surface of the land. These cellars have from six to eighteen inches of water in them for a considererable part of the spring. The houses are heated in many instances with furnaces to a temperature of 70 to 74 degrees.

"When east winds set in, a constant flow of damp air, alternating with heated currents, pervades the buildings. Catarrhal affections are very frequent; rheumatism, chlorosis and anæmia appear among those who are compelled to remain within doors.

"It is a prevalent custom to keep the window-blinds constantly

closed, thereby excluding sunlight. The furniture and closets are damp in wet weather, and when the season of fogs sets in, constant care is required to keep clothes from mildew."

Truro.—Consumption prevalent. "I think this is owing to the east winds and fogs from the ocean, and also somewhat to the mode of living, as there is but little fresh meat used here."

Topsfield.—Consumption prevalent. Special cause found in wet soil, which may be improved in some degree by drainage. The soil of the hills, as well as that of the lowlands, is wet.

Air has been rendered putrid by the emanations from slaughter houses which have existed many years in and near the village.

Tisbury.—"Influenza has been recently very prevalent, affecting all ages. Rheumatism, both acute and chronic, is a common disease, and doubtless owing to cold and damp, and the occupation of the people. Of chronic diseases, dyspepsia is the most universal; nearly every other person you meet suffers from indigestion in some form. The causes are chiefly the mode of cooking, and irregularity in eating. The frying-pan is in universal requisition. Still I believe that the sudden changes of temperature, to which we are subject, produce their effect on the digestive organs. We have a large proportion of 'nervous people,' so called, especially in the upper or western part of the island."

West Newbury.—"The soil a clayey loam, impervious in a great degree to moisture. As the hills have been shorn of their natural growth, the intervening swamps have become suitable for cultivation, but are still wet and cold, until the surface water has run off or evaporated. There are very few cellars in town that have not water in them during the wet season, and they are almost always damp. I have heard many complain this spring of having a foot or more of water in their cellars. The consequence is that consumption in its various forms finds many victims. In the westerly part of the town is a swamp two miles long and half a mile wide which produces wood, or, if cleared, an inferior grass. By ditching it and clearing out an old and useless dam, the whole district would be rendered more healthy. The condition of the town, as regards both health and prosperity, would be improved by thorough drainage.

"Air is rendered foul in the neighborhood of *comb-shops*, from the pith of the horns of slaughtered cattle. This is taken out and

put in piles, making an almost intolerable odor, and constituting a nuisance which ought to be abated."

Wakefield.—Two severe epidemics of dysentery have occurred in the past six years, coming on when the surrounding bogs were dried up. Soil usually very wet. Cellars have more or less water in them nearly all the time. Houses are damp,—much mould observed in them. Both epidemics of dysentery were preceded by an epidemic of scarlet fever.

West Boylston.—Typhoid fever rather prevalent and has been for more than twenty years. Cause not obvious. A river town with interval lands ascending to beautiful hills. Most of the wood cut off. Soil pervious in some parts, impervious in others; somewhat springy. Interval lands not well drained. Drainage, much neglected.

Westborough.—"Situation of village low as in a basin, shut off from winds, with dry soil and subsoil of quicksand. Typhoid fever and consumption much more rare than on the exposed hills around us where the ground is wet from a clay subsoil."

West Roxbury.—Believed to be a more favorable place for consumptives to live in than many others. The deaths occurring from consumption are, in great part, of persons who have come here to live, after being attacked with the disease.

West Stockbridge.—"Pneumonia and bronchitis are quite prevalent. I attribute this to the occupation of the people more than to anything else. The mining of iron ore is the chief business. The miners work underground in wet and damp places; they come to the surface in a state of perspiration and are thus subject to sudden changes of atmosphere. This district, like all of Berkshire County, is mountainous. The village is situated in a valley with a mill-pond in its midst, which in summer is often quite low and from which arises offensive effluvia from decaying vegetable matter; yet all the epidemics that I have witnessed here have originated and been most severe on the high ground. These epidemics have been dysentery, diphtheria and measles."

Winthrop.—See remarks under the head of Typhoid Fever.

Wrentham.—This region seems to be remarkably conducive to

health; elevated, well-drained, good water. Excellent natural sanitary advantages; of course, some minor artificial nuisances exist; little attention is paid to the condition of cellars; drains and privies are often in too close proximity to wells, giving rise to dysentery and typhoid.

Wellfleet.—Affections of the lungs prevalent. The general cause is found in locality. Exposure to cold, damp, east winds. Consumption is more prevalent in the valleys that run across the Cape, and on damp soil.

Weymouth.—Diseases of respiratory organs prevalent; due in great part to location of village; exposed to east and north-east winds. Soil clayey and moist.

"Bone factory does not tend to purify the air."

Walpole.—Our correspondent refers to the cases of "charbon" or "malignant vesicle," which have occurred in Walpole and which are separately described in another part of this volume.

Worcester.—No disease is found to specially prevail during a series of years. The proportion of consumption is large, as it is everywhere. Smallpox and varioloid have recently been very prevalent, but the epidemic has now subsided as vaccination has been general. Large numbers of persons at all ages were found to be unprotected by vaccination. The opinion is expressed by our special correspondent that greater power to enforce vaccination and, in case of need, to remove cases to a smallpox hospital should be given to local boards of health.

The subject of drainage is receiving much attention in Worcester. Through the heart of the city runs a brook which is now being enclosed by a covered stone wall, to be used as the main sewer. A complete system of sewers is in process of building; the outlet will be the Blackstone River.

Waltham.—Consumption more prevalent than in some of the neighboring agricultural towns, but not more so than in manufacturing towns generally. Waltham is situated in a basin drained through its centre by Charles River. Soil generally light and porous.

It is worthy of observation that although the people living in the immediate vicinity of the manufactory of sulphuric acid in this town are, during every damp day, constantly subjected to an at-

mosphere sufficiently charged with sulphurous acid gas to be very irritating to the air-passages of a person first coming into it, neither they nor the people engaged in the manufactory are apparently in any way permanently affected by it.

Westhampton.—Regarded as an exceedingly healthy town. Soil loose and stony. Good elevation. Very hilly. Excellent drainage. Our correspondent is informed that scarlet fever, although often present, has been for eighty years past non-malignant, and his observation in recent years confirms it.

Upton.—Lung diseases prevalent. Soil rather dry on the low lands and springy on the high lands. Not, on the whole, wet.

"A very large proportion of the women work on straw goods at their homes. From January to June, which is the busy season, they often work immoderately. I have theorized that this has been one strong predisposing cause of consumption; 1st, by overtaxing the strength; 2d, by the dust and fumes from the braid (much of which has been treated with sulphur and oxalic acid), irritating the sensitive throats, exciting cough and opening a road to disease."

CHARBON IN MASSACHUSETTS.

BY

ARTHUR H. NICHOLS, M.D., OF BOSTON.

ON THE OCCURRENCE OF CHARBON, OR MALIGNANT VESICLE, IN MASSACHUSETTS.

In comparing the maladies which affect mankind with those to which the lower animals are subject, we cannot fail to be impressed with the fact, that it is with the greatest difficulty that contagious diseases can be transmitted from the former to the latter, and even when the attempt is apparently successful, the symptoms invariably assume so mild a type as to be scarcely recognizable. Thus, the material containing the poisonous element of smallpox, scarlet fever, measles or syphilis has been repeatedly introduced into the blood of cattle, horses, sheep, dogs and rabbits, in the majority of cases without any visible result, and in no instance producing serious symptoms.

Man, on the other hand, by no means possesses the same immunity with regard to the diseases of inferior animals, for some of the most virulent and fatal affections to which we are subject, such as hydrophobia and glanders, are derived from dogs, horses and cattle, and when once thoroughly established, in a large proportion of cases, in spite of all treatment, terminate unfavorably.

In the year 1858, there first appeared in the town of Walpole, in this State, a most singular disease, which was recognized by the attending physician as *Charbon*, or *malignant vesicle*, a malady known from remote antiquity as prevailing among animals, but observed among mankind only within a comparatively recent period.*

* A pustular eruption, accompanied with some local inflammation, and caused by the inoculation of putrid animal matter, is not uncommon among men employed in discharging vessels laden with hides.

This affection, which resembles an ordinary dissection wound, is sometimes ascribed to the action of some of the chemical substances employed in curing the hides, or to the bite of an insect which is thought to have been brought with them from South America.

In these cases the poison is as a rule quickly eliminated without producing any serious results, and differs essentially in its character and effects from that of Charbon, with which it may possibly be confounded.

The same disease has since revisited the same locality at irregular intervals, until, at length, during a period of seventeen years, twenty-six cases have come under observation, a very able report of which was given by Dr. Silas E. Stone at the last meeting of the Massachusetts Medical Society.

The object of the present paper is to review briefly the symptoms of the disease and the different theories of contagion, and, at the same time, enumerate the prophylactic measures which have been proposed to arrest its course and avert its recurrence.

This affection has of late attracted no little attention in Europe, where, in certain countries, and particularly in portions of France and Germany, it prevails extensively as an epidemic, whereas, in the United States, it is none the less interesting from the extreme rarity of its occurrence.

Different writers give very discordant accounts of the symptoms and morbid anatomy of charbon, so that it is difficult to frame an unexceptionable description of the disease. The fluctuations of opinion which have at various times prevailed on this subject are indeed remarkable; so that, even now, many standard authorities fail to distinguish the different forms which the disease is capable of assuming.

Recent researches, however, have materially diminished the uncertainty connected with the matter, and it is now established that the poison of charbon, like that of scarlatina and syphilis, may manifest itself in a variety of ways, sometimes causing external lesions in the skin, at other times attacking the spleen, liver, lungs, or intestines, in all cases, however, accompanied by severe constitutional disturbance. The identity of the different forms has been demonstrated by the fact that the poison of each is respectively capable of producing the others.

I.—Symptoms.

Charbon is the result of a specific poison introduced into the body, and characterized by different symptoms, according to the method by which the virus enters the circulation. If implanted on some uncovered part, there is noticed, after a period of latency or incubation varying from a few hours to several days, a minute red spot or papule, not unlike a flea-bite.

This point now becomes the seat of a small vesicle which

soon bursts and dries up, and is afterwards surrounded by other similar concentric vesicles, at first separate, but subsequently confluent, and all running the same course.

Meanwhile, under and around the base of the original papule appears a well-defined layer of thick, hardened tissue, involving the thickness of the skin and compared to a disk of sole-leather, which creaks when cut with a knife, presenting almost as much resistance as cartilage. The cut surfaces have the appearance of ordinary fibrous tissue, mottled with black pigment. At the same time a peculiar gangrenous inflammation, not unlike erysipelas, arises from the point originally affected, and spreads in all directions with the greatest rapidity. Later, the inflamed tissue becomes firmer and darker, and loses all vitality, so that it may be pressed or even pricked without the patient being aware of it; the neighboring lymphatic glands become enlarged, delirium sets in, and death ensues with the usual symptoms of blood-poisoning. The duration of this variety of the disease varies from one to several days.

In favorable cases, the course of the inflammation is suddenly arrested; a vivid red circle appears around the gangrenous portion; the patient feels an agreeable warmth and returning pulsation in the affected part, and the dead tissue is finally separated from the living, in the form of a brown lozenge, leaving behind a suppurating surface of various extent in different cases. [Aitken, Virchow, Smith, Stone.] In rare cases, two or more vesicles have been noticed upon different parts of the same individual.

In another variety of the disease the external manifestations may be confined to a mere erysipelatous-like inflammation, without any vesicle (malignant œdema), while, in a third class of cases, death may ensue without gangrene, vesicle, œdema, or other external symptom whatsoever, which serves in a measure to mask the nature of the malady.

It must be confessed, the anomalous forms which charbon often assumes, and more especially the absence of all external lesions, render, at times, the diagnosis of the disease difficult if not impossible.

Virchow * states that he has not unfrequently met with cases

* Virchow ueber Milzbrand. Handbuch der speciellen Pathologie und Therapie. Erlangen, 1855. II. Band, 1 Abth.

where suspicious vesicles were present on the neck and face, and where death quickly ensued, which would undoubtedly have been considered instances of charbon, had they occurred in a district where this malady was prevalent.

II.—Symptoms in Animals.

In animals, as in man, there is not much constitutional disturbance at the beginning of the disease. The premonitory symptoms, according to Virchow, are loss of appetite, a stiff gait especially marked in the hind legs, a dejected look, trembling of the limbs and body, and a weak pulse. These symptoms become greatly intensified upon the appearance of the vesicles, which may occur in a few hours or not for several days. The pulse then increases in frequency, the temperature is raised and the respiration hurried. With the complete formation of the vesicle, the crisis of the disease is usually reached, and the unfavorable symptoms either abate, while the vesicle shrinks and disappears with the diminution of the fever, or, in other cases, a sort of gangrene attacks the affected part and death rapidly ensues. In other forms of this affection, as in man, death may be sudden and unaccompanied by vesicles, swelling, or other local manifestation.

In the so-called *Apoplexia Carbunculosa*, for instance, the strongest animals of a herd, while feeding, or at work, are at times attacked with dyspnœa, trembling, cramps and bloody discharges from mouth and nose, and succumb, either at once or in the course of the day. In other cases, the malady seems to bear a close resemblance to hydrophobia. Here the animals snap, bite, run and finally fall into a kind of fit, which may be followed by partial paralysis, and results fatally in one or two days.

It has been considered by some that the virulence of the attack depends upon the appearance of the vesicles. Garreau, for example who inclines to this theory, reports that of 118 cattle affected with charbon, 112, in which no external manifestations were noticed, died, whereas six upon which vescicles were formed, recovered. In horses, as in man, there seldom arises more than one collection of vesicles, but in cattle, several are frequently found upon spots remote from each other.

It has been noticed that, as in the cattle-plague, the poison

varies greatly in intensity at different times, as is indicated by the marked difference in the severity of the symptoms. It is remarkable, moreover, that, as in the former disease, not the feeble, but rather the stout, well-nourished beasts are selected as the victims.

While the progress of the disease is generally arrested by a very low degree of temperature, a warm, moist atmosphere is thought to be favorable to its advance.

III.—Of the Morbid Changes in the Tissues and Internal Organs.

These are almost identical in man and in animals. The principal seat of the disease appears to be the blood, for the changes in this fluid are uniformly the same. It is found to be darker and thicker than in health, sometimes having almost the color and consistence of tar, and being filled with minute parasitic growths known as bacteria. The spleen has also been found in most cases to be the seat of serious changes, forming the chief reservoir of the poison as in intermittent or typhoid fever. This organ is enlarged, and distended with dark-colored blood, while its substance is softened and at times almost fluid; and such is the constancy with which these changes are found that in France the name "*sang du rate*" has been given to the disease. The liver, lungs, kidneys and veins are all found to be distended and gorged with blood. In the venous system, this distension is best marked in the vessels of the subcutaneous tissue, intestines and lymphatic glands, while in all these localities ecchymosed patches are found, extending, in the case of the subcutaneous tissue, deep down between the muscles.

In the thoracic and abdominal cavities of animals, has been noticed a peculiar yellow, serous-like fluid which at times becomes almost gelatiniform, and which has been proved to be intensely virulent when introduced into the bodies of other animals. In man, however, while the changes in the lymphatic glands, and especially those in the immediate vicinity of the vesicles, is more frequent than in the cases of animals, the spleen and liver are less commonly affected, while the serous effusion in the thoracic and abdominal cavities is rare.

With regard to the situation of the vesicles, it is to be observed that the parts of the body which are usually uncovered (as the

face, neck, chest, arms, head, and, in certain trades, the feet), are almost exclusively affected. The disease, it is true, sometimes appears in other situations, but always under such circumstances that the apparent exceptions only confirm this fact. Thus, it is reported that a butcher, in slaughtering a diseased animal, placed a soiled knife between his teeth, and the malady appeared in the mouth. Again, the blood of a slaughtered beast trickled down the back of a man who was carrying it, and the disease broke out in the parts with which the blood had come in contact.

IV.—Theoretical Considerations as to the Nature of the Morbid Poison or Contagium in Charbon.

The nature and origin of specific virus or contagium in charbon, as well as in other contagious diseases, has of late attracted the attention of several eminent observers, and although this whole problem is still involved in considerable obscurity, yet many of the physical properties of the poisonous principle have been demonstrated by careful experiments, the results of which there is reason to believe, will pave the way for additional and more practical conclusions.

The following summary of the facts and observations regarding the contagious principle, and the nature of the contagious process appears in a recent report* of Dr. Burdon Sanderson on the "Intimate Pathology of Contagion." It serves to give an idea how great advance has been made in this important field, and thus has a direct bearing upon our subject.

There are different liquids, existing in the diseased body, and characteristic of the various contagious affections, which, being introduced into the healthy body, have the property of reproducing the disease. It was with some of these infecting liquids that the experiments referred to were made, and vaccine lymph, being the most familiar, is selected as an example.

Dr. Lionel S. Beale first called attention, in the year 1864, to the existence in vaccine matter, of certain minute particles, transparent and of spheroidal form. These he regarded as living or germinal matter, and advanced the theory that they might contain the contagious principle. The same bodies were also recognized independently, about the same time, by Professor

* Twelfth Annual Report of the Medical Officer of the Privy Council.

Chauveau* of Lyons, who carried the investigation still further, and demonstrated conclusively that the activity of the vaccine matter is contained exclusively in these particles. M. Chauveau starting with these elements of vaccine lymph, viz., the recently discovered particles, the larger bodies, known as leucocytes, and the serum which holds them in suspension, proved,

First,—that the leucocytes when separated from the serum by simply allowing them to subside are absolutely inactive when employed for inoculation.

Second,—all the soluble elements of the lymph were next separated (by the so-called method of diffusion), and it was shown by repeated experiments on children and animals, that the soluble constituents, like the leucocytes, produce no result.

Third,—that the minute particles above described are insoluble, and that moreover the activity of the vaccine lymph depends entirely upon their presence.

These experiments were subsequently completely verified by Dr. Sanderson, and disprove the previously accepted theory, namely, that because vaccine matter is transparent, and moreover is most active when most transparent, that therefore the contagious principle must be soluble.

The elements of the contagious liquid of sheep-pox were examined in the same manner, and with equally satisfactory results. In this malady, it appeared that the infecting liquid is much more concentrated than in the case of smallpox, as illustrated by the fact that while in the former affection the liquid can be diluted with only ten times as much water without losing its activity, in the latter, three hundred times its weight of water may be added, without impairing its infecting quality.

If in the above cases the dilution is carried to a still greater degree, the chances of a successful inoculation are proportionately diminished, or, in other words, the greater the quantity of water added, the greater the chances of failure; but whatever the degree of dilution, the effect produced (provided any effect is produced), is invariably the same. These effects of dilution afford the strongest evidence that the contagious principle is composed of separate particles, and moreover does not possess the physical properties of a vapor, for no other hypothe-

* Determination experimentale dis éléments qui constituent le principe de la sérosité vaccinale virulente. Comptes Rendues, LXVIII., 1868, p. 289.

sis can be framed which tallies with the combination of phenomena here presented.

The assumption that the infecting virus is volatile, inasmuch as its effects are exercised at a considerable distance from its source, is then no longer tenable.

As to the specific gravity of the above particles, we are justified in inferring, that it must be the same as the fluid in which they are suspended, inasmuch as there is little or no disposition on their part to subside, so that however long the fluid containing the virus is allowed to stand the superficial layers remain as active as those beneath.

Another and more difficult problem is whether the particles of contagium owe their specific power to the fact that they are organized, and possess in themselves vitality, or whether their qualities are to be ascribed to their chemical composition. This question is purely a speculative one, and as yet involved in very great doubt.

Dr. Sanderson maintains that the phenomena of contagion, as manifested by the multiplication of the particles in the body is totally unlike any chemical change with which we are familiar. On the other hand if we assume the contagious principle to be a living, organic ferment, having the power of multiplication when deposited in living tissues, and that its simple transference will therefore be the exciting cause of the disease, then most of the phenomena to be accounted for may be explained in a very satisfactory manner. It is not necessary to assume that the blood-poisoning is the immediate result of the multiplication of the virus cells. On the contrary, from what is known with regard to the familiar ferment, yeast, it would seem more probable that this poisoning is the result of some chemical change in the constituents of the blood, caused by the growth of these cells within it. In yeast, for instance, we know that as the cells multiply, they absorb sugar, and secrete alcohol and carbonic acid, and it is not unreasonable to infer that, in a similar manner, the virus cells are nourished by extracting some substance from the blood and secreting in turn another substance, the presence of which has the effect of a blood poison.

There is every reason to hope that the experimental study of the various forms and metamorphoses of the organic substances

found in contagious matter, and the chemical changes which take place in them may in the end throw much additional light on the process of infection. In this connection may be mentioned the researches of Davaine and Hallier, who believe that certain organic forms known as bacteria and microzomes found in the contagious fluid, and which, when transferred to the blood of healthy from that of diseased animals, have the power of reproducing the disease, are identical with the contagious particles. M. Davaine claims to have proved, by experiments similar to those of M. Chauveau with vaccine lymph, that the poisonous element of charbon resides exclusively in these bacteria, and that when they are eliminated from the blood, the latter no longer retains its poisonous power. These organic forms (bacteria) are described by Hallier as consisting of cells either spheroidal or of the form of a short cylinder, and endowed with a peculiar progressive oscillatory movement. It has been demonstrated by Dr. Edward Schwarz* of Vienna that these cells are formed under certain conditions from still smaller organisms known as micrococci (microzymes) or microspores which have the appearance of minute round cells, filled with a transparent liquid and containing several nuclei. They differ in no respect from those spores or germs deposited in certain states of the atmosphere upon the moist surfaces of bread, vegetables and the like. It should not be overlooked, however, that these different parasitic growths have been found in the body in health, and they moreover accompany nearly every disease characterized by blood-poisoning.

Thus, bacteria are found in the blood in hydrophobia, glanders, syphilis and snake poisoning; micrococci abound in the blood in recurrent fever, and are still more numerous in scarlet fever; they are contained in the pustules of smallpox and cow-pox; also in the sputa in case of measles, and the alvine liquid of dysentery. As no specific difference exists in the appearance of these organic growths in the various diseases it is not pretended that the different contagia can be distinguished from each other. Inasmuch, however, as it has been noticed that under certain circumstances, the metamorphoses they undergo are essentially different, it is therefore claimed by Hallier that a distinction may be eventually found upon the different

* Wiener Med. Zeitung, April 3, 1870.

forms to which they gradually unfold. If this distinction can be demonstrated, it will, of course, indicate that a most intimate relation exists between the germs, and the different diseases in which they are found.

Other eminent observers, on the other hand, claim that no great importance should be attached to the presence of these organic growths in the blood, because, as has already been noticed, they are found in the body in health as well as in disease, and though multiplied greatly in certain diseases, they are really but harmless concomitants of the disease, acting as poisonous agents only by serving as rafts for transferring the morbid material. They maintain that these so-called germs, whatever may be their origin, remain passive or latent in the healthy body, but when, in certain morbid conditions, the blood and other fluids become diseased, they find therein an appropriate pabulum, by absorbing which they are nourished and multiplied just as, in the forests, certain vegetable fungi flourish only upon the trunks of dead and decaying trees and plants.

This view is thus forcibly expressed in a recent work* by Mr. Lionel S. Beale:—

"In various cases in which certain fungi do actually invade our tissues, the evidence of change in these last having occurred prior to the development of the fungi is sometimes so distinct, that, so far from the fungus attacking a healthy structure, and damaging it, the structure itself had deteriorated and changed or had undergone morbid derangement ere it was invaded.

"By decay it would appear that it had become converted into material adapted for the nutrition of the fungi, the growth of which had been effectually resisted as long as the tissues remained healthy. If this be so, the fungi cannot be regarded as the *cause* of the disease, any more than the vultures which devour the carcass of a dead man can be looked upon as the cause of his death."

None the less weighty are the objections urged by Dr. Richardson of London in a recent address.

"The germ theory fails altogether to account for the immunity from recurrence of the communicable diseases, such as scarlet fever

* Disease Germs. L. S. Beale. London, 1870.

and smallpox, by virtue of a previous attack. Why cannot persistent organisms, which ever reproduce themselves in suitable soil, reoccupy the same soil, and live and reproduce there again? Can they not enter the body a second time? Or, entering it cannot they re-assert their activity? Can a man be charged with germs of smallpox or scarlet fever and remain unaffected by them? Again, if germs, capable of independent multiplication, are the cause of the diseases, why should there be recovery at all when once the body becomes infected? If the theory were true, then the body infected with organisms which, so long as they find a soil, are reproducible, should have no chance of recovery; for what is to prevent the continuance of the process of reproduction? But the facts are, that the majority of persons suffering from communicable diseases recover."

From the above quotations it will be seen that neither the vital nor the chemical or physical theory of the origin of communicable diseases is as yet satisfactorily demonstrated. Nor can either of these thories be accepted or rejected till additional investigations have increased our knowledge of the exact origin of microzymes. The problems to be solved are thus stated by Dr. Sanderson :—

"Do microzymes naturally exist as particles of living tissue, and thus take part not only in morbid processes, but in the performance of the normal functions, or are they originally morbid and imported into the body from without, being derived from the tissues or organs of other infected individuals, or produced by the transformation of the contents of the reproductive cells of the parasitic fungi nhabiting the higher plants?

"(a.) Is it true that the destructive parasites which inhabit the tissues of many of our common plants produce microzymes by a normal process of development?

"(b.) Are such microzymes respectively endowed with destructive morbific properties?

"(c.) Is it true that microzymes take part in any of the normal chemical functions, especially those which relate to the transformation of the albuminous compounds?

"(d.) Can they arise *de novo* in living tissues in mere consequence of impaired activity of nutrition?"

Meanwhile it must be acknowledged that there are very

strong grounds for inferring that the virus of charbon, like that of vaccine lymph and cow-pox, consists of minute organic matter of unknown origin which, under certain conditions, instead of undergoing chemical decomposition, is capable of preserving its activity outside the body and of being transferred as solid particles from place to place; but, having been introduced into the blood, becomes developed and multiplied, and thus causes the characteristic symptoms.

This hypothesis, if accepted, is sufficient to enable us to explain how the disease may be communicated, and how, by the aid of certain chemical compounds, contagious matter may be neutralized or destroyed.

V.—Methods and Sources of Infection.

While most writers have considered that in animals charbon may originate spontaneously, like intermittent fever in man, from miasmatic emanations, yet it has been established by repeated observations, that the districts in which the disease prevails as a epizoötic, have not been characterized by any marked peculiarity either of climate or soil. On the contrary, it has been known to break out spontaneously in the most elevated regions as well as in marshy districts; in cultivated as well as in uncultivated tracts; in barns as well as in the open air.

M. Davaine, who has had unequalled facilities for investigating this disease in France, has undertaken to demonstrate that flies prove the chief source of the contagion, by sucking the blood of an infected animal and thence conveying the poison to others. Those insects, especially, which are armed with piercing probosces, seem qualified for transferring the poison in this way, but it is also possible that the wings and feet of ordinary flies may serve as rafts to convey the poisonous matter to the bodies of both animals and men.

But whatever may be the facts regarding the origin of the disease in animals, the great mass of testimony goes to prove that, in our race, the poison is exotic, being derived invariably from some of the lower animals, and the affection is most virulent when communicated by direct inoculation from horses and cattle, either during their life or shortly after their death. As the poison adhering to the various tissues of the animal is by no means destroyed when dried, or macerated in water, it is

not surprising that the persons most commonly affected with the disease are those whose occupation brings them in frequent contact with animals or animal remains, such, for example, as butchers, tanners, drovers, herdsmen, soap-boilers, manufacturers of glue, and workers in wool and horse-hair.

It is not essential that the poison should be deposited in a wound or on an excoriated surface, for experience has shown that a drop of blood or serum from a diseased animal, placed upon the skin, may in a short time cause the formation of a vesicle and the attendant symptoms.

Nothing can indicate more clearly the possible modes of infection than the report of the cases occurring in the practice of Dr. A. H. Smith* at Las Cruces, New Mexico:—

"Two men were engaged in skinning an animal which had died of the distemper. One of them had a pimple on the face which he had scratched with his nails till it bled. The other had received a scratch from a thorn in passing through the chaparral. The day was extremely warm, and the men frequently wiped the perspiration from their faces with their hands, covered, as they were, with the fluids from the animal. In a few hours vesicles were developed upon the abraded surfaces in both individuals." * * * * * "One case, occurring in the hand, made its appearance immediately after handling a number of dry hides." * * * * * "In another instance, the source of infection was a goat which, having the symptoms of the distemper, was killed, and the flesh eaten by the family. Although several persons ate the meat, that one alone was affected who prepared it for the table."

Equally instructive are the cases reported by Dr. Pennock, occurring in Philadelphia. Here, one man, while engaged in skinning a cow that had died a few hours before, was bitten on the thumb by a mosquito. He scratched the bitten spot with the bloody fingers of the other hand, and four days afterward a vesicle was observed on this spot. Another man received a slight wound on his left hand while handling the same cow, and four days afterward a vesicle appeared on the spot of the incision.

Instances like these might be multiplied indefinitely, but the above are sufficient to illustrate how all objects which have

* Amer. Journal of Med. Sciences, Vol. LIII.

been in contact with the blood, hair or carcasses of diseased animals may be the means of communicating the disease to others.

They will also explain those singular cases recorded by Hildebrandt, in which dogs ate with impunity the flesh of animals which had died of charbon, but communicated the disease, by biting, to cattle and horses.

The question as to whether the flesh of animals that have died of charbon can be eaten with impunity has been discussed at length by those who have given this subject their attention. While numerous instances are on record in which the carcasses of diseased animals have been served to soldiers and others, in large quantities, without producing any bad results, exceptional cases are related by Fournier and Ammon,* where death quickly followed after eating such meat, although evidence is here wanting to show that this meat was thoroughly cooked.

Another not less interesting problem is whether charbon is transmissible from one human being to another, or whether the poison is exhausted in man, and here again the testimony of authorities is somewhat discordant. Thomassin† relates a case where a woman contracted the disease from direct contact with her husband, and similar instances are quoted by Fournier‡ and Stone,§ while Heilbach‖ reports an instance where the malady was apparently communicated by a child to its mother.

It will be admitted, however, that these instances are of so very rare occurrence as to justify the conclusion that the danger of contagion from this source must be exceedingly small.

VI.—Observations on the Epidemic at Walpole.

If we turn now to the consideration of the disease as it has prevailed at Walpole it will appear that in August, 1853, a workman in a certain factory was taken suddenly ill, and died two days after, a well-marked characteristic vesicle having in the meanwhile appeared.

No other similar case is known to have occurred until April, 1861, when another man expired after an illness of twenty-four

* Unterricht über den Milzbrand, Ammon, p. 60.
† Thomassin. Diss. sur le charb. Malin., p. 31.
‡ Fournier Observ. et Exper. sur le charb., Malin., p. 9.
§ Stone. Publications of the Mass. Med. Society, Vol. III., p. 84.
‖ Heilbach, Diss. Inaug. de carb. malig. Berol., p. 16.

hours, having obscure symptoms of blood-poisoning, but without the appearance of any vesicle. Two months later, this was followed by another case, accompanied by a vesicle upon the neck.

These scattering cases attracted at that time but little attention, and the disease seems to have stopped here, without recurrence to any process of disinfection.

In March, 1866, another operative died, manifesting unmistakable symptoms of charbon, and from that time till July, 1869, the malady seems to have lurked about this same factory, indicating its presence at pretty regular intervals. During this period seven or eight cases have occurred each year, the average number of operatives employed being about eighty.

The following table (taken from the report of Dr. Stone) will indicate the total number of cases that have been observed up to the present time,* the particular varieties of the malady and the results :—

	Died.	Recovered.	Total.
Malignant Vesicle,	5	10	15
Internal Lesions,	8	2	10
Malignant Œdema,	1	–	1
Total,	14	12	26

The annexed list shows the seat of the vesicles, which were invariably upon an exposed part:—

Neck,	6
Face,	5
Shoulder,	1
Nose,	1
Scalp,	1
Arm,	1

The malignant character of the malady will be appreciated when it is observed that of the fatal cases, five succumbed within twenty-four hours of the attack, in none of which, by the way, were any vesicles formed. If, now, we attempt to seek

* November, 1870.

the source of the contagion in these instances, we shall be at once struck by the fact that of the above twenty-six patients, twenty-four were employed in manufacturing curled hair. Of the other two, one was a carpenter who, a short time previous to his attack, had worked about the buildings connected with the factory, and the other was seized shortly after having nursed her husband who had been ill with the same malady. The fact that no other similar cases are known to have occurred in the town or in the State, and that in these the symptoms were nearly all unmistakable, lead to the conviction that the *materies morbi* was here introduced into the town through the medium of the hair employed in the factory.

This hair is sheared from the necks and tails of living wild horses, and is imported in bales, for the most part from Buenos Ayres, a small portion only being brought from Europe.

At the factory it is taken from the bales, picked apart by hand and sorted according to the quality and color, and then passed through a picking machine which separates the individual hairs and removes all foreign substances. It is next spun into ropes, boiled and finally dried in a heated compartment, by which the curl is set, and the ropes are now coiled and forwarded to the warehouse. During all these processes, the hands of the operatives are brought constantly in contact with the hair, while in the vicinity of the picking machine, the air is loaded with minute particles of dried animal matter, so that there is every facility for absorbing the poison by both contact and inhalation. There is a decided difference in the qualities of the hair imported, some specimens being quite clean, while others are often matted together with dirt and putrid animal matter.

Portions of this animal matter have been repeatedly introduced into the bodies of rabbits without producing any characteristic effects, and there are therefore no sufficient grounds for the belief that any of this unclean hair was charged with the virus of charbon, and the nature of the poison must, in the present state of our knowledge, render it impossible to distinguish hair that is thus infected from that of sound animals unless recourse is had to actual inoculations.

For a long while it was found difficult to convince many that the disease was in any way connected with the hair, and the

rarity of its occurrence, compared with the number of those exposed, was urged as an objection to this theory. To this, the obvious reply is, that the immunity of those who escape merely shows the susceptibility of the human race to contract the disease is small, and serves to illustrate one of the well-known laws of morbid poisons, viz.: "that many individuals are unsusceptible of their influence in the absence, at least, of peculiar predisposing causes." In hydrophobia, for instance, according to Hunter and Vaughan, only one out of twenty or thirty bitten by mad dogs contract the disease.

There are other and larger factories in New York, Philadelphia and Baltimore all of which obtain their supplies of hair from the very same sources.

When a cargo of hair arrives at New York, it is at once distributed among these different factories, and it has therefore been urged that it is somewhat remarkable, that, if large quantities of diseased hair were imported, all of it should have found its way to Walpole, and it is certain that the most careful inquiry has failed to discover a single instance of the disease or anything resembling it, in any other factory. Merchants employed in importing the hair in vessels to this country assert that no cases of the disease have ever occurred, to their knowledge, while, at the place of export in South America, persons have been known to be engaged for years in constantly handling the hair, without being aware of any bad effects therefrom. It must be remembered, however, that it is by no means necessary to assume that any very large amount of diseased hair has been imported, to account for the Walpole manifestations. We have already seen that the *materies morbi*, when dried may retain its activity for an indefinite period. Now throwing aside the three cases that occurred in 1851–1853, if we have reason to think that the hair of one affected animal was introduced into the factory at the beginning of the year 1866, it will be possible to account for the cases which have occurred since that time. We have only to suppose the morbific matter attached to the hair of one diseased horse to have entered the buildings at that time, and to have been scattered about the walls and floors by the process of manufacture; that it was afterwards stirred up from time to time and conveyed by means of the

hands or through the medium of the air to some portion of the body of an operative, and thus to have inoculated the disease.

This view will appear more plausible when it is considered that during this period, no efficient means were taken to disinfect the buildings, and that since a thorough disinfecting process was adopted, but one mild case of the disease has taken place, although a period of sixteen months has now elapsed.

As has been previously mentioned charbon is very seldom met with in the United States, so that there are but few instances on record where it has prevailed to any extent.

In the autumn of 1834, an epizoötic of this nature broke out among cattle in and around Philadelphia, and the poison was communicated to several persons who had been engaged in skinning the dead bodies of these animals. Four of these cases, which occurred in the practice of Dr. C. W. Pennock were reported at length in the Amer. Jour. Med. Sciences.*

The same distemper appeared among cattle in the vicinity of Las Cruces, New Mexico, in the summer of 1865, and here, again, was communicated to quite a number of individuals, the mode of infection being in many instances demonstrated beyond a doubt. A very clear account of these cases, by Dr. A. H. Smith, will be found in the same journal.†

Dr. A. L. Pierson of Salem, states that the malady occurred formerly in that city every few years, generally among men engaged in unloading hides from vessels, or among curriers and tanners. He gives a brief account of five of these cases in one of the numbers of the Boston Medical and Surgical Journal for 1852,‡ one of which is here given:—

"On the 29th of October, 1850, I visited an Irishman of previous good health and temperate habits, with a sore on the chin, looking like an abrasion with a margin of vesication. He had left off his work as a journeyman currier the day before, on account of feeling unwell. The margin of the sore was very hard, purple and hot. The tumefaction and induration of cellular membrane rapidly extended, without the least abatement, during the five following days. The whole front of the neck became turgid, the eyes nearly closed, the cheeks and parotid glands distended, and at the period of death it had reached the clavicles. No suppuration evinced itself in any part of the swelling. The pulse grew fearfully rapid, the respira-

* Vol. XIX., p. 13, 1836. † Vol. XXXIV., p 481, 1867. ‡ Vol. XLVII., p. 75.

tion hurried, the heat of the skin was intense, the mind wandered on the last three days, and death took place on the fifth day of my attendance."

Some of the other cases reported by this gentleman would, I am inclined to think, be more properly included under the head of malignant carbuncle, a totally different affection.

Although other establishments in this country have fortunately not been visited with this malady, similar factories in Europe have not enjoyed the same immunity. Trousseau* narrates that in two French factories for working up horse-hair imported from South America, in which from six to eight hands were, on the average, employed, there were twenty deaths from charbon in the course of ten years.

In Chelius' System of Surgery,† a brief allusion is made to two similar cases occurring among operatives in a horse-hair manufactory.

VII.—On the Value and Application of Disinfectants or Antiseptics.

We have already learned from the experiments of Beale, Hallier, Sanderson and Davaine what (for the present at least) may be assumed as the nature and properties of the poisonous element in charbon, and we are now the better prepared to consider the more practical part of the inquiry, viz.: whether the agents known as disinfectants and antiseptics really exert a decided and powerful action upon organic matter and vital phenomena.

This question is discussed by R. Angus Smith, F. R. S. and William Crookes, F. R. S., in their very elaborate and exhaustive report‡ on the cattle plague in England, giving the results of a series of careful experiments to demonstrate the comparative value of different disinfecting and antiseptic agents, such as chlorine, ozone, sulphurous acid and the tar acids.

The term "disinfectants" is meant to apply to those substances, which neutralize or destroy animal poisons by oxidation or some similar action. One of the most active and common disinfectants is heat. Clothing, wool, hair and similar sub-

* Gaz. Medic. 1847. Feb. No. 4.

† Vol. I, p. 69.

‡ Report from Commissioners; Cattle Plague. Vol. XXII, p. 187, London, 1866.

stances placed in boiling water half an hour become thoroughly disinfected, inasmuch as the vitality of all organic cells must in this way be destroyed.

"Antiseptics" include those agents which prevent chemical change by destroying the tendency to putrefy or ferment. Such is the action of carbolic acid in preserving meat.*

These experiments were made upon skins, hides, meat, yeast, air and infected matter, and some of the most decisive are here quoted.

"I. A few drops of carbolic acid, added to a half a pint of sugar syrup and yeast in full action immediately put a stop to fermentation.

"II. Fresh brewers' yeast was washed with a solution of one per cent. of carbolic acid and then with water. Its power of inducing fermentation in solution of sugar was entirely destroyed, although no perceptible change in the appearance of the yeast-cells could be detected under the microscope. The experiment was repeated several times, and always with the same result, although when the yeast was simply washed in water, it readily induced fermentation."

The above experiments prove conclusively that carbolic acid has a special action on the fermentation induced by organic matter; it not only arrests it instantly when in progress, but it prevents the development of future fermentation.

From still other experiments, it is demonstrated that carbolic acid acts, not as sulphurous acid is thought to do, by retarding oxidation through its affinity for oxygen, nor, on the other hand, does it possess the power of coagulating albumen. It must, therefore, be admitted that it attacks the vitality of organic substances in some manner which as yet remains unexplained.

The following illustrates the action of this subtance (carbolic acid) on organic life.

"III. Cheese mites were immersed in water where they lay for several hours. A few drops of a solution of carbolic acid, containing one per cent. killed them instantly.

"IV. An aqueous solution of carbolic acid was added to water in which a small fish was swimming; it proved fatal in a few minutes.

*Antiseptics have been called also by Dr. Angus Smith "colytics" from κωλύω, I arrest.

"V. A very minute quantity of a weak solution of carbolic acid was added under the microscope to water containing various infusoria, such as bacteria, vibrious amœbœa, etc.

"The acid proved instantly fatal, arresting the movement of the animalcules at once. These animalcules are the almost invariable accompaniments of putrefactive fermentation.

"The above experiment has been tried with putrid blood, sour paste and decayed cheese, and in every instance, the destruction of vitality and the arrest of putrefaction have been simultaneous.

"VI. Caterpillars, beetles, crickets, fleas, moths and gnats were covered with a glass, the inside of which was smeared with carbolic acid. The vapor proved quickly fatal.

"It is also recorded by Dr. Lemaire that the vapor of carbolic acid will kill flies, ants and their eggs, lice, bugs, ticks, acari, and mosquitos and other insects of this size.

"VII. French experimentalists have repeatedly tested the influence on vaccine lymph of carbolic acid. They have employed lymph both pure, and mixed with a trace of carbolic acid. The vaccination with pure lymph was followed by the usual results, but in no instance was any effect produced by the lymph containing carbolic acid."

The following experiment tends to show a similarity between the action of vaccinal virus and that of the cattle plague.

The air from a close, highly infected shed, containing animals in the last stage of the disease, was drawn through glass tubes containing tufts of cotton wool, in the expectation that some of the virus cells supposed to be floating about in the air would be arrested by the wool. One piece of the infected wool was then exposed for half an hour to the vapor of carbolic acid. Two apparently healthy calves were then selected, and an incision being made beneath the skin, these pieces of wool were respectively inserted in each. The animal thus inoculated with the infected wool, which had been exposed to carbolic acid, remained perfectly well, but the other animal took the disease and died in a few days.*

"VIII. Experiments made upon farms in regions where the cattle plague was raging have afforded complete proof of carbolic disinfection. In some instances, the cattle upon properly disinfected

* As the plague was raging in the vicinity, it is possible that the calf which died did take the disease from the wool.—W. C.

farms have remained perfectly healthy, although whole herds were attacked and swept off upon farms a few hundred feet distant, which were not disinfected.

"In other instances, where the plague had appeared upon a farm, and the premises were subsequently disinfected, the disease seems to have been suddenly arrested. It appeared, moreover, that when a plague did enter a disinfected shed, it lost, in a great measure, its virulence, and was deprived of its infectious character. In one instance, forty-five disinfected animals were turned out to grass, and at the same time removed from the protecting influence of carbolic acid. Within a few days, the plague attacked and killed the whole of them."

After many practical trials, and a full consideration of the relative merits of the principal disinfectants, Mr. Crookes has concluded that,—

"Chlorine and ozone have the power of converting animal poisons into simple and innocuous substances by their property of oxidation. That the tar acids neither accelerate nor interrupt oxidization, but they act most powerfully in arresting all kinds of fermentative and putrefactive changes, and annihilate with the greatest certainty all the lower forms of animal life."

"That the most powerful, and at the same time most simple, process of disinfection, applicable to living beings, as well as buildings, is to employ the *tar acids*,* as constant æriform and liquid disinfectants."

The positive and satisfactory nature of these results indicates very clearly the importance of resorting at once to energetic measures of disinfection, whenever there is reason to suppose that any infected hair exists in a factory, like that at Walpole.

These measures may be briefly summarized as follows:

I. All suspected hair should be thoroughly disinfected, either by boiling for one-half hour, or by wetting with a solution of carbolic acid in proportions of two ounces to one gallon of water.

*The tar acids are known as carbolic and cresylic acids. Of these, carbolic acid, the most familiar, is a white crystalline solid, prepared from coal or wood tar, which becomes liquid when a small quantity, (5 per cent.) of water is added.

Pitch and other substances of which these acids form the active principle, have been employed from the most remote times as antiseptics, having been used by Egyptians in embalming mummies.

The former process is the one which has thus far been adopted by the proprietors of the Walpole factory, from the belief that it would be more efficacious. It has been found, however, that boiling the hair extracts a large proportion of the animal oil contained in it, thereby destroying its elasticity, rendering it more difficult to pick and spin, and causing considerable diminution in the weight.

It remains, therefore, to be decided whether on the whole, the application of the acid is not less expensive, and equally efficacious, since the weight of hair is not diminished by its use, nor its quality impaired. Furthermore, as the hair is invariably boiled in the latter stages of its manufacture, all odor left by the acid must thereby be removed.

II. The rooms to which the hair has been admitted should be thoroughly disinfected. The roofs and walls should be washed with lime. The floor and woodwork should be washed with water containing soda, and then sprinkled with a solution of carbolic acid. The clothing, boots and shoes of the operatives also demand attention, as the seeds of the disease may have attached themselves to some of these articles.

III. Those who are obliged to handle hair suspected of being infected should previously anoint their hands with a mixture of carbolic acid and lard, in the proportion of one drachm to the ounce.*

In the above observations no allusion has been made to the value of different remedies or modes of treatment, from the conviction that much more important results are to be obtained by the attempt to arrive at correct views of the nature and causes of the malady, and by anticipating its effects rather than by seeking to cure or mitigate them. It is gratifying to be able to report that the prophylactic measures carried out at Walpole have thus far been attended with satisfactory results. These results are confirmatory of the views of those who have paid most attention to sanitary questions, and afford proof that the labors of these men have been of very great advantage to mankind.

* A supply of this ointment is kept in constant readiness in the different apartments at the Walpole factory.

THE CAUSES

OF

TYPHOID FEVER IN MASSACHUSETTS.

AN INQUIRY INTO THE CAUSES OF TYPHOID FEVER, AS IT OCCURS IN MASSACHUSETTS.

It may be stated in round numbers that one person out of every thousand in Massachusetts, between the ages of five and seventy, dies yearly from typhoid fever. Excluding the extremes of youth and age within these limits, the proportion would be much larger. Reckoning the mortality at one in ten of those attacked, it seems very certain that more than one per cent. of the able-bodied adult population is rendered helpless every year from this disease, and for a period often extending through many months. Add to this the loss of time on the part of nurses and attendants, and it will be seen that the bread-winning efficiency of the people is impaired in a way which might be expressed in dollars, and it would certainly amount to a very large sum,—how large we do not pretend to estimate. Neither can we place in definite form the misery which the killing and wounding, from this cause, of so many persons in the prime of life, brings upon their kindred. The object of the present inquiry is to find out, if we can, whether all this loss and wretchedness is inevitable. If it shall appear that it is, either in whole or in part, avoidable, the information will be of value. The question is a difficult one and may not be completely answered at once, but by the collection of such evidence as now exists among us, we shall be brought nearer to its final solution.

We first seek to know where typhoid fever prevails; to learn something of its distribution; to compare different localities in a general way, and to find out in what towns or what class of towns it is most frequently present. Here we need a careful registration of sickness, but this is not to be had as yet, either in Massachusetts or in any other country. The time is coming when in some form or other it will be demanded and obtained.

The best we can now do is to estimate the prevalence of this disease, as of all others, by the official report of deaths. An epidemic of typhoid may have a fatality in certain years and under certain circumstances of season or place, which may vary from one in three to one in twenty; but taking a series of years this element of error diminishes in force.

The disease may be called by a wrong name in the returns from the towns. This is certainly possible in some cases, but typhoid fever has very marked characters, and before death occurs, its nature can hardly fail to be recognized. No disease, except perhaps consumption, or the eruptive fevers, is less liable to be mistaken for others.

We do not wish to overstate the value of registration returns of the causes of death. They are certainly liable to error, but after much examination we believe them to be made with great care by trustworthy and intelligent men. The system of registration has now been in use in Massachusetts for thirty years, and has been constantly improving.

The information with regard to deaths from typhoid fever received through registration, is to be taken as the opinions of the town-clerks, based usually on the certificates of medical attendants, and, in their default, upon the declaration of surviving friends, and in rare cases upon common report.

The deaths from typhoid have always been classed with deaths from infantile fever, which latter term is vague and unsatisfactory. To eliminate this source of error, the death records of every town at the office of the State secretary have been searched for the ten years 1859–1868 inclusive, and the result is given in a table, showing the total and comparative mortality from typhoid fever, during this period, in persons over five years of age, in all parts of Massachusetts.

Another kind of evidence available in this inquiry, is that presented in the *opinions* of our correspondents all over the State, concerning the relation of cause and effect in typhoid fever as they have watched it. These opinions are full of interest and value. Discordant they surely are, and must necessarily be on a question of such obscure nature. Each judges from his own point of view, influenced by the varying circumstances of locality, opportunity, faith in the possibility of discovering causes, the character of his own mind.

And let no one imagine that, because physicians disagree, it is to their discredit as observers. How often do the twelve men of a jury entirely agree, even when direct visible proof is presented to them? How many engineers, or underwriters, or carpenters would entirely agree as to the causes of injury in a bridge, or a vessel, or a house, seeing only the destructive effects?

Yet the physician, in looking for the causes of disease in that most complex of all machines, the human body, is as yet but groping in the dimmest twilight. A century or two ago it might even have been thought irreverent to pry into these secrets of nature, and even yet there lingers in some minds a doubt as to the propriety of asking why we are sick.

The remote and essential causes of the phenomena which the physician witnesses in typhoid fever, are as yet almost completely hid from his eyes. He can only associate conditions of the most various sort with their apparent effects, and by a long series of such observations, be prepared to state his convictions concerning them.

It may be said of the questions addressed to our correspondents that they indicate preconceived opinions, that they are leading questions. To a certain extent this is true, and it could hardly be avoided. To bring out definite replies it was necessary to ask definite questions, but the evidence which we have received has been arranged to support no theory, but to establish truth. Whoever could present facts carefully observed, or professional opinions based upon general experience, has been welcomed in this inquiry, and his testimony is presented in the following pages.

The circular of May 1st, 1870, had two special objects:—1st. To obtain all information possible concerning the agency of filth in causing typhoid fever, either through the medium of air or of drinking-water; and 2d, to discover, if possible, whether the same relation exists between the height of subsoil water and epidemics of typhoid in Massachusetts as has been recently found at Munich in Bavaria.

Dr. Max Pettenkofer of Munich, a chemist and philosopher of world-wide repute, has made known of late, chiefly through the pages of the "Zeitschrift für Biologie," some views of the nature of cholera and typhoid fever, which are of singular interest.

His observations upon the first disease do not now concern us, but they led directly to the extension of the same ideas to the enteric fever of Munich, which may be regarded as identical with our typhoid. The subject has been still further elaborated, and at great length, by Dr. Bühl of Munich, and other followers of Pettenkofer. They contend, and, in so far as Munich is concerned, they demonstrate that epidemics of enteric fever stand in a fixed relation to certain obscure and as yet inexplicable changes in the soil, which changes are signalized by the fluctuations in the height of ground-water. The years of greatest mortality from enteric fever have been the years of lowest water-level; the years of least mortality, of highest water-level; and the variations between these extremes of mortality have coincided with the comparative depth at which water is found in the soil.

These observations have been made during the past fifteen years; and within that period the degree of danger from typhoid fever has been correctly indicated by the depth of water in the wells. Upon these and similar observations elsewhere in Germany, Dr. Pettenkofer and his followers have founded an hypothesis that the causes of typhoid are to be found in *the soil*, not in the water of the soil, which is regarded simply as an index, like the face of a clock, recording changes going on behind it; and that the fever-seed or germ is the result of "organic processes" taking place in the earth, and communicated to man through the medium of air. What these changes are, or in what the fever-germs consist, are unexplained.

These views have met with great opposition, and particularly in England, where belief in the contamination of drinking-water by animal excrement is very generally accepted as the chief cause of typhoid. The facts reported by Pettenkofer have been interpreted in England to mean that in a season of drought foul matters are retained in the loose soil, and that the area of drainage for each well is greatly increased by the subsidence of the ground-water level. In certain English towns the water level was permanently reduced by artificial drainage, while pure water was brought in from springs and streams for the use of the inhabitants, with a marked reduction in the mortality from typhoid.

Another and similar cause for fever is found by English writers in the washing of soluble filth from the loose soil into the wells by the first rain-fall after a drought.

Pettenkofer and his school do not deny the general importance of having drinking-water free from taint, but think that the artificial drainage of the English towns signifies no more in contradiction of the Munich experience as regards typhoid fever than the movement of the face of a clock by human hands would influence the rotation of the earth. Setting the soil-clock at typhoid will not cause the disease. Not until the soil is "typhoid-ripe" will that form of fever appear. Filth will foster and increase its virulence, but will not originate it. Pettenkofer believes that air coming from the soil (and not water) is the common vehicle of the typhoid poison, and he urges upon all who seek to know the causes of this disease to study the soil and the changes of character which it undergoes, not merely on the surface but at all depths above that at which water fills its pores.

Table of Deaths of Persons above five Years of age from Typhoid Fever in Massachusetts during Ten Years, 1859 *to* 1868, *inclusive.*

Counties and Towns.	Population in 1865.	Deaths in 10 Years.	Average No. of persons living each year to one Death.	Counties and Towns.	Population in 1865.	Deaths in 10 Years.	Average No. of persons living each year to one Death.
Barnstable County.				*Berkshire—Con.*			
Barnstable,	4,928	34	1,449	Lenox,	1,660	22	754
Brewster,	1,456	8	1,857	Monterey,	737	15	491
Chatham,	2,624	16	1,640	Mt. Washington,	237	1	2,370
Dennis,	3,592	43	835	New Ashford,	178	1	1,780
Eastham,	757	8	946	N. Marlborough,	1,649	31	532
Falmouth,	2,283	31	736	Otis,	956	23	416
Harwich,	3,540	57	621	Peru,	494	6	823
Orleans,	1,585	17	932	Pittsfield,	9,676	93	1,040
Provincetown,	3,472	18	1,929	Richmond,	944	20	472
Sandwich,	4,158	31	1,341	Sandisfield,	1,411	26	542
Truro,	1,447	9	1,608	Savoy,	866	22	394
Wellfleet,	2,296	15	1,530	Sheffield,	2,459	69	356
Yarmouth,	2,472	26	951	Stockbridge,	1,967	28	702
				Tyringham,	650	9	722
Berkshire County.				Washington,	859	9	954
Adams,	8,298	111	7,475	W. Stockbridge,	1,620	23	704
Alford,	461	3	1,537	Williamstown,	2,555	23	1,110
Becket,	1,393	16	870	Windsor,	753	5	1,506
Cheshire,	1,650	11	1,500				
Clarksburg,	530	4	1,325	*Bristol County.*			
Dalton,	1,137	22	517	Acushnet,	1,251	14	893
Egremont,	928	6	1,547	Attleborough,	6,200	57	1,087
Florida,	1,173	14	837	Berkley,	847	9	941
Great Barrington,	3,920	36	1,089	Dartmouth,	3,435	29	1,184
Hancock,	937	7	1,339	Dighton,	1,813	11	1,648
Hinsdale,	1,517	16	948	Easton,	3,076	30	1,025
Lanesborough,	1,294	4	3,235	Fairhaven,	2,547	24	1,061
Lee,	4,035	65	621	Fall River,	17,451	136	1,286

Table of Deaths of Persons—Continued.

OUNTIES AND TOWNS.	Population in 1865.	Deaths in 10 Years.	Average No. of persons living each year to one Death.
ristol—Con.			
town,	1,485	9	1,650
sfield,	2,130	15	1,420
Bedford,	20,853	162	1,287
ton,	4,709	23	743
nham,	1,868	18	1,038
oboth,	1,843	18	1,024
onk,	928	3	3,093
erset,	1,789	13	1,376
nzey,	1,336	14	953
nton,	16,005	98	1,633
tport,	2,799	33	848
ukes County.			
mark,	548	3	1,827
artown,	1,846	11	1,678
old,	108	–	–
ury,	1,696	34	499
sex County.			
sbury,	4,181	28	1,493
over,	5,314	56	949
erly,	5,942	68	874
ford,	868	12	723
lford,	1,566	15	1,044
vers,	5,144	46	1,118
x,	1,630	22	735
getown,	1,926	30	642
cester,	11,937	94	1,270
eland,	1,619	22	736
ilton,	799	6	1,332
erhill,	10,740	49	2,192
ich,	3,311	23	1,440
rence,	21,698	181	1,199
,	20,747	188	1,104
afield,	725	5	1,450
chester,	1,643	26	632
blehead,	7,308	52	1,405
uen,	2,576	15	1,717
dleton,	922	10	922
ant,	313	2	1,565
bury,	1,362	23	592
buryport,	12,976	64	2,027
h Andover,	2,622	33	795
body,	6,051	27	2,241
tport,	3,367	26	1,295
ley,	1,191	15	794
m,	21,189	126	1,682
bury,	3,609	29	1,244
gus,	2,006	11	1,824
mpscott,	1,535	7	2,193
field,	1,212	16	757
ham,	918	8	1,147
t Newbury,	2,087	22	949
nklin County.			
field,	1,221	12	1,017
ardston,	902	15	601
kland,	1,922	26	739
rlemont,	994	9	1,104

COUNTIES AND TOWNS.	Population in 1865.	Deaths in 10 Years.	Average No. of persons living each year to one Death.
Franklin—Con.			
Coleraine,	1,726	23	750
Conway,	1,538	21	732
Deerfield,	3,038	40	759
Erving,	576	8	720
Gill,	635	5	1,270
Greenfield,	3,211	56	573
Hawley,	687	6	1,145
Heath,	642	4	1,605
Leverett,	914	19	481
Leyden,	592	5	1,184
Monroe,	191	2	955
Montague,	1,574	21	750
New Salem,	1,116	18	620
Northfield,	1,660	26	639
Orange,	1,909	24	795
Rowe,	563	6	938
Shelburne,	1,654	20	827
Shutesbury,	788	8	985
Sunderland,	861	8	1,076
Warwick,	901	15	601
Wendell,	603	10	603
Whateley,	1,012	18	562
Hampden County.			
Agawam,	1,664	18	925
Blandford,	1,087	25	435
Brimfield,	1,316	13	1,012
Chester,	1,266	11	1,151
Chicopee,	7,577	59	1,284
Granville,	1,367	30	456
Holland,	368	6	613
Holyoke,	5,648	38	1,486
Longmeadow,	1,480	12	1,233
Ludlow,	1,232	23	536
Montgomery,	853	9	948
Palmer,	3,080	32	962
Russell,	618	12	516
Southwick,	1,155	19	607
Springfield,	22,035	213	1,034
Tolland,	511	7	730
Wales,	696	11	632
Westfield,	5,634	89	633
West Springfield,	2,100	22	954
Wilbraham,	2,111	42	503
Hampshire County.			
Amherst,	3,415	33	1,035
Belchertown,	2,636	31	850
Chesterfield,	801	8	1,001
Cummington,	980	12	817
Easthampton,	2,869	37	775
Enfield,	997	19	525
Goshen,	411	2	2,055
Granby,	908	13	698
Greenwich,	648	9	720
Hadley,	2,246	21	1,070
Hatfield,	1,405	15	937
Huntington,	1,163	16	726
Middlefield,	727	6	1,216

Table of Deaths of Persons—Continued.

Counties and Towns.	Population in 1865.	Deaths in 10 Years.	Average No. of persons living each year to one Death.
Hampshire—Con.			
Northampton,	7,925	87	911
Pelham,	737	8	931
Plainfield,	579	12	482
Prescott,	596	3	1,987
South Hadley,	2,099	21	1,000
Southampton,	1,216	27	450
Ware,	3,374	46	733
Westhampton,	636	5	1,272
Williamsburg,	1,976	27	732
Worthington,	925	15	617
Middlesex County.			
Acton,	1,660	14	1,186
Arlington,	2,760	13	2,123
Ashby,	1,080	20	540
Ashland,	1,702	23	740
Bedford,	820	13	631
Belmont,	1,279	2	6,395
Billerica,	1,808	11	1,644
Boxborough,	454	1	4,540
Brighton,	3,854	19	2,028
Burlington,	594	5	1,188
Cambridge,	29,112	134	2,173
Carlisle,	642	5	1,284
Charlestown,	26,399	154	1,714
Chelmsford,	2,291	19	1,206
Concord,	2,232	12	1,860
Dracut,	1,905	18	1,058
Dunstable,	533	2	2,665
Framingham,	4,665	36	1,296
Groton,	3,176	28	1,134
Holliston,	3,125	26	1,202
Hopkinton,	4,132	26	1,589
Hudson,*	–	12	–
Lexington,	2,220	13	1,708
Lincoln,	711	3	2,370
Littleton,	967	9	1,074
Lowell,	30,990	191	1,623
Malden,	6,840	55	1,244
Marlborough,	7,164	45	1,592
Medford,	4,839	24	2,016
Melrose,	2,865	12	2,388
Natick,	5,208	46	1,132
Newton,	8,975	59	1,521
North Reading,	987	13	759
Pepperell,	1,709	23	743
Reading,	2,436	18	1,355
Sherborn,	1,049	10	1,049
Shirley,	1,217	12	1,014
Somerville,	9,353	40	2,338
Stoneham,	3,298	29	1,137
Stow,	1,537	18	854
Sudbury,	1,703	17	1,002
Townsend,	2,042	30	681
Tyngsborough,	578	5	1,156
Wakefield,	3,244	19	1,707
Waltham,	6,896	56	1,231
Watertown,	3,779	19	1,988
Wayland,	1,137	7	1,624
Westford,	1,568	26	603
Weston,	1,231	8	1,539
Wilmington,	850	10	850
Winchester,	1,968	4	4,920
Woburn,	6,999	58	1,207
Nantucket,	4,748	33	1,439
Norfolk County.			
Bellingham,	1,240	7	1,771
Braintree,	3,725	23	1,620
Brookline,	5,262	18	2,923
Canton,	3,318	13	2,552
Cohasset,	2,048	23	890
Dedham,	7,195	52	1,384
Dorchester,	10,717	53	2,022
Dover,	616	2	3,080
Foxborough,	2,778	38	731
Franklin,	2,510	22	1,141
Hyde Park,†	–	2	–
Medfield,	1,012	8	1,265
Medway,	3,219	30	1,073
Milton,	2,770	27	1,026
Needham,	2,793	22	1,269
Quincy,	6,718	41	1,639
Randolph,	5,734	37	1,550
Roxbury,‡	28,426	167	1,702
Sharon,	1,393	12	1,161
Stoughton,	4,855	45	1,079
Walpole,	2,018	10	2,018
West Roxbury,	6,912	20	3,456
Weymouth,	7,975	41	1,945
Wrentham,	3,072	22	1,396
Plymouth County.			
Abington,	8,576	53	1,618
Carver,	1,059	18	588
Duxbury,	2,384	20	1,192
E. Bridgewater,	2,976	34	875
Halifax,	722	15	481
Hanover,	1,545	15	1,030
Hanson,	1,196	20	598
Hingham,	4,176	15	2,784
Hull,	260	–	–
Kingston,	1,626	13	1,251
Lakeville,	1,110	15	740
Marion,	960	19	505
Marshfield,	1,809	11	1,644
Mattapoisett,	1,451	19	764
Middleborough,	4,565	49	932
N. Bridgewater,	6,332	46	1,377
Pembroke,	1,489	26	572
Plymouth,	6,068	41	1,480
Plympton,	924	18	513
Rochester,	1,156	13	889
Scituate,	2,269	15	1,512

* Three years only. † One year only. ‡ Nine years only.

Table of Deaths of Persons—Concluded.

Counties and Towns.	Population in 1865.	Deaths in 10 Years.	Average No. of persons living each year to one Death.
Plymouth—Con.			
South Scituate,	1,635	17	962
Wareham,	2,798	24	1,166
W. Bridgewater,	1,825	12	1,521
Suffolk County.			
Boston, (9 years,)	192,318	949	2,026
Boston and Roxbury, (1868,)	220,744	122	1,809
Chelsea,	14,403	86	1,675
North Chelsea,	858	1	8,580
Winthrop,	633	3	2,110
Worcester County.			
Ashburnham,	2,153	29	742
Athol,	2,814	30	938
Auburn,	959	16	599
Barre,	2,856	37	772
Berlin,	1,061	20	530
Blackstone,	4,857	32	1,518
Bolton,	1,502	31	485
Boylston,	792	5	1,584
Brookfield,	2,101	21	1,000
Charlton,	1,925	18	1,069
Clinton,	4,021	27	1,489
Dana,	789	7	1,127
Douglas,	2,155	17	1,267
Dudley,	2,076	41	506
Fitchburg,	8,118	86	944
Gardner,	2,553	20	1,276
Grafton,	3,961	58	683
Hardwick,	1,967	9	2,185
Harvard,	1,355	7	1,936
Holden,	1,846	11	1,678
Hubbardston,	1,546	31	499
Lancaster,	1,752	21	834
Leicester,	2,527	15	1,685
Worcester—Con.			
Leominster,	3,313	21	1,577
Lunenburg,	1,167	12	972
Mendon,	1,207	8	1,508
Milford,	9,108	64	1,423
Millbury,	3,780	29	1,304
New Braintree,	752	9	835
Northborough,	1,623	10	1,623
Northbridge,	2,642	16	1,651
N. Brookfield,	2,514	27	931
Oakham,	925	14	661
Oxford,	2,713	22	1,233
Paxton,	626	13	482
Petersham,	1,428	20	714
Phillipston,	725	16	453
Princeton,	1,239	15	826
Royalston,	1,441	37	390
Rutland,	1,011	9	1,123
Shrewsbury,	1,570	20	785
Southborough,	1,750	13	1,345
Southbridge,	4,131	47	879
Spencer,	3,024	30	1,008
Sterling,	1,668	16	1,042
Sturbridge,	1,993	16	1,246
Sutton,	2,363	30	787
Templeton,	2,390	36	664
Upton,	2,018	17	1,175
Uxbridge,	2,838	11	2,580
Warren,	2,180	26	838
Webster,	3,608	62	582
Westborough,	3,141	29	1,083
West Boylston,	2,294	30	765
West Brookfield,	1,549	31	500
Westminster,	1,639	26	630
Winchendon,	2,801	26	1,077
Worcester,	30,055	254	1,183

The first thing which strikes us on looking over this table is the apparently greater mortality from typhoid in the small towns. How great this difference is will appear from the following comparison:—

Table showing relative mortality for Ten Years from Typhoid Fever in persons above five years of age, in the larger and smaller Cities and Towns.

	Population 1865 (All Ages.)	Total Deaths from Typhoid in Ten Years.	Av'ge No. of persons living each year to one Death.	Av'ge No. of Deaths each year to 1,000 Persons living.
One hundred and forty-seven (147) cities and towns of more than 2,000 inhabitants,* . . .	1,044,294	7,888	1,323.90	0.755
One hundred and eighty-four (184) towns of less than 2,000 inhabitants,†	213,468	2,539	840.75	1.189

There can be no doubt that typhoid in Massachusetts, is a disease of scattered communities rather than of crowded towns, of rural rather than of urban districts. In spite of the smaller mortality from all causes, typhoid is more destructive in the farming towns than in the manufacturing towns and the large cities. This is an important fact in the study of the causes of the disease, and one which we shall have occasion again to refer.

Our circular of May 1st relating to typhoid fever asked four questions. Replies have been received from one hundred and sixty-three (163) towns. The replies are tabulated under each question.

1. Have you observed a difference in the prevalence of this disease between houses supplied with water from wells about the premises, and houses supplied with water conveyed from springs or from ponds of unquestionable purity?

Replies.

Yes, ...	23
No difference has been remarked, . .	71
Whole supply of town from wells, . .	18
Indefinite, ...	51

2. Can you inform us whether, at times when typhoid prevailed, the water of the wells was rising or falling, and whether it was higher or lower than the average for the year?

* Not including Monson and Bridgewater (State Almshouses), Hyde Park and Hudson.
† Not including Tewksbury (State Almshouse).

(If your attention has not been given to the height of subsoil water as marked by the wells, will you have the kindness to note it in future epidemics, and let us know the result?)

Replies.

Rising after being very low,	11
Falling,	16
Very low,	36
Have not observed,	100

3. Have you observed any connection between typhoid fever and foul soil, whether from privies, pigsties, manure heaps, or similar collections of decomposing matter lying on the ground?

Replies.

Yes,	79
No,	45
Doubtful,	39

4. Have you observed any connection between typhoid fever and putrid air, whether from rotting vegetables in cellars, bad drains, unventilated living or sleeping rooms, or from any other cause?

Replies.

Yes,	90
No,	36
Doubtful,	37

Ten towns report that typhoid fever is a disease almost unknown among them, and for this reason they can give no information.

The following are the replies on this interesting subject in the form of opinions based on professional experience, from our correspondents in the various towns.

Andover. "Something more than twenty years ago there appeared in one of the English medical journals an article written with much ability, the object of which was to show that the defective sewerage of London was the cause of a large amount of sickness. Statistics were given running through a series of years, showing that the mortality from *bowel complaints* and fevers had

been uniformly inversely to the amount of rainfall to wash out the sewers, particularly during the hot months. The statistics were of this kind. In the month of —— from the 20th to the 30th there was no rain sufficient to wash out the sewers, and the mortality from these diseases was constantly increasing. On the 30th, a heavy rain, followed by a diminution of the mortality; but, as no more rain fell for the next twelve days, the mortality again increased till another rain, and so on.

"Some sixteen years ago I was mentioning this to a very intelligent and observing man and an old resident, who stated that the same had always been true in this town. My observation since that time has convinced me that he was entirely correct. The English writer's conclusions with regard to defective sewerage I cannot regard as proven. The statistics only go to show that the mortality from these diseases is inversely to the amount of rainfall. The less rain, the more typhoid fevers and other cognate diseases I apprehend is the rule or law the world over, not only in the cities but in the country also. But the fevers thus caused may not be developed until after more rain and the water in the wells is again rising. I believe that the law is not confined entirely to the summer season, and to fevers and bowel complaints, but is of more general application to nearly all (especially acute) diseases, and to all seasons of the year. Rain is undoubtedly the great purifier of the atmosphere from the causes of disease."

Our correspondent, in a subsequent letter states that from personal experience and observation in Siam he finds confirmation of the views above expressed.

Attleborough. "In localities where typhoid fever prevails, foul soil or foul air, under conditions corresponding to questions three and four, have almost always been detected. Still, I have seen some very striking instances of immunity from typhoid in positions where the pythogenic influences were conspicuous, and where the assumed fever producing elements must have existed in a concentrated form. In view of these exceptions, I have been compelled to think that there must be a preparatory receptivity in order to make the exciting influences noxious."

Amherst. "Typhoid fever is a common disease here. * * I have now in mind a house where, at one time, fever seemed endemic. The cause was found in decaying vegetables and filth in the cellar. These being removed, the disease disappeared."

Ashland. "The most unhealthy part of our village is not on the plain but is a street extending along the south side of a hill. During the past two years there have been cases of typhoid fever on this street quite out of proportion to the number of inhabitants. Two years ago this location was a piece of woodland. It was cleared, and ten tenement houses erected on it for the accommodation of twenty families. Soil, a gravelly loam resting on a gravelly subsoil and very rocky. The land is springy, and water stands in the cellars of these houses five or six months in the year. No pigsties; and privies five rods distant from the houses. Water from wells. From the land having been so recently cleared, there is much decaying vegetable matter on the ground and in the soil. The structural ventilation of these houses not more deficient than other houses of the village, but as there are no shade-trees, and the houses stand on the south side of the hill, and all the roofs are flat and covered with a black composition absorbing much heat, the air of the sleeping rooms in summer was exceedingly hot. We may say that the ventilation of the houses was virtually poor.

"We may consider the practical facts presented in this connection to be these: That quantities of decomposing matter, whether from pigsties, privies, vegetables in cellars, or *decomposing leaves of newly cleared land*, combined with *dampness* and *deficient ventilation* may be among the causes of typhoid fever; bearing in mind that the disease is propagated by contagion. Another thought worthy of notice is the question of the influence of the mind as a predisposing cause. All the inmates of these houses were strangers in town; families imported by the factory company from different parts of the country. Strangers in a strange land, away from all the sympathies of friends and neighbors, subject to all the emotions of home-sickness, depressed by the uncertainties of new undertakings, and constantly undergoing the fatigues of toil."

Athol. "Typhoid fever has not prevailed to any great extent during the past eight years. Most of the cases have occurred in a certain part of Athol proper. In this locality the land is very high, the soil cold, thin and marshy; no running water, no drainage. There is no known impurity in the well water. Connection has been traced in this locality between typhoid and foul soil and air.

"On the other hand, cases have occurred in various localities where no connection seemed to exist with these causes."

Ashburnham. Last autumn there were some thirty cases of typhoid in town; no cause recognized. Water mostly from springs.

Beverly.—Our correspondent reports ten cases of typhoid of a very severe type, occurring in one family, in November, 1865. The house stands near the ocean, but on a hill seventy feet above high-water mark. The hill slopes in every direction from the house, and is mostly rock. The house is built on rock, is large and airy. The cause of the fever was found in the following circumstances:—The privy was only about eight feet from the house and exceedingly foul. The sink spout ran into a hogshead, and the odor from this and the ground immediately about it was intensely putrid. Two families occupied the other end of the building, and no cases of fever occurred among them. About seventy persons acted as watchers and attendants upon the sick family, and not one took the disease. The weather before this outbreak of fever had been very wet, and, just previous, very hot and dry.

Berkley.—"There is one house where typhoid fever has been more prevalent than in any other in the town. Its situation is as follows: Soil dry, gravelly and sandy; on the south is a course of swamps with water sometimes a little stagnant; on the north is a deep pond-hole with some vegetation growing in it, quite near the house, and surrounded with hills on the north-east, north and north-west. When in the fall of the year the wind blows for some time from the north-east, over the woody hill and across the pond-hole, I expect typhoid fever in that house, and I have not often been mistaken. I have observed this for the past twenty-six years."

Brookline.—Our correspondent gives the result of his observations during twenty years of practice in this town. He writes as follows:—"By consulting the town records I find that during the ten years, 1860-1869 inclusive, there were but twenty deaths from typhoid fever. Of this number fifteen were in the class who live in well-built comfortable homes, and five in the crowded homes of the poorer and laboring classes. I have been unable to obtain the relative numbers of these two classes of our population, yet my experience has been that the poorer class has not been so liable to typhoid fever as the wealthier portion of the community.

"The larger proportion of typhoid cases which have been under my care in the fall of the year must be referred to epidemics or atmospheric influences existing in other towns where the subjects of the disease had been visiting. One fatal instance this autumn commenced ten days after the patient returned from Conway, N. H. Four individuals in one family had very severe typhoid, one at Nahant, and three after returning thence to Brookline. And

so with nearly all the cases I remember during the past six years. Although I believe in the necessity of careful drainage, I must say that I have never had cases that I could attribute to bad drainage, but many that I could trace to decaying vegetables in cellars.

"I have always supposed that moisture and heavy fogs had a great deal to do with the existence of typhoid fever, as it has been the scourge of towns in the vicinity of rivers and brooks, and where large extents of meadow land were uncovered by the heat and evaporations of summer.

"In 1846 or 1847 a serious and malignant epidemic of typhoid-dysentery raged on Bradlee's Hill, and in the houses in the vicinity of the reservoir, then in process of construction, in a locality which in other years had been healthy. At that time, I attributed the epidemic to the turning over and exposure to the air of the meadow mud filled with decaying roots and other vegetation. Something of the same kind occurred in Brighton, on breaking ground for the Brighton reservoir, but owing to the smaller number of houses in the neighborhood the epidemic was less noticeable.

"It is the custom in Brookline at this season to cover the grass and garden-beds around the houses with manure, often taken from the pigsty, filling the air with an intolerable stench. To be sure the frost soon checks decomposition, and the rains wash out the odor, yet we might expect this practice would excite disease, but I have not noticed any such result."

Boston.—The answer to the first question of the circular of May 1st, requires a comparison to be made, as regards typhoid fever, between the Boston of a quarter of a century ago, and the Boston of to-day. Previous to 1848 the water supply of the inhabitants was to a very limited extent from Jamaica Pond, but in by far the larger portions from wells. These wells were very numerous; almost as much so as the privy vaults with which they were in close proximity. After an extensive fire, such as frequently occurred at that time, the foul character of the soil drained by these wells was very evident. The water nevertheless was, although "hard," generally clear and sparkling, as is not unusual with water containing a large proportion of nitrates, the result of decomposition.

The water of Lake Cochituate was brought into Boston in the autumn of 1848, and was very soon received by the whole population. The wells were abandoned and filled up, or now only exist as receptacles for dirt and rubbish.

We have endeavored in various ways to ascertain the relative

frequency and severity of typhoid fever before and since the introduction of the unquestionably pure water of Lake Cochituate.

The following table gives the number of deaths for each year from 1846 to 1867, reported as from typhoid or typhus. Previous to 1846 no record was made.* We have therefore only the three years 1846, 1847 and 1848 to compare in statistical form with the nineteen subsequent years. Moreover, the year 1847 was marked by the importation of a great number of cases of true typhus, known here as "ship-fever," occurring among the immigrants arriving at this port.

It is unnecessary that the distinction made by physicians during the past thirty years between typhus and typhoid, should be enlarged upon in this connection, but it is important to remember that the two diseases were confounded by every one before that period, and that true typhus, although occasionally originating here, is a rare disease, while typhoid is exceedingly common. For our present purpose, with the exception of the ship-fever of 1847, the two forms of fever may be regarded as one. Our oldest physicians (while recognizing the differences, which have been perfectly defined) still speak of typhoid as typhus, and we wish to be understood as classing together these two nearly related forms of continued fever.

With this explanation, the following table may be taken as a close approximation to the truth with regard to mortality from typhoid fever in Boston :—

* Since the above was written we have seen an old record of deaths and their causes in Boston for nearly every year, from 1825 to 1846, which is preserved at the office of the City Registrar. Although this record is too imperfect for use in statistical form, it seems right to say that it gives the impression that while typhoid fever was somewhat more fatal, and therefore probably of more frequent occurrence, in those years than at the present time, it would be wrong to suppose that the death-rates, which prevailed in 1847 and 1848 were the rule previous to the introduction of pure water. Those were exceptional years in so far as we can discover, and the great mortality from fever was due in part at least to the importation of foreigners who brought disease with them.

Table of Deaths from Typhoid and Typhus Fever in Boston, 1846–1867.

(Previous to the Annexation of Roxbury.)

YEAR.	Typhoid.	Typhus.	Totals.
1846,	–	133*	133
1847,	–	666*†	666
1848,	–	288*	288
1849,	30‖	119	149
1850,	43	61	104
1851,	82	88	170
1852,	66	46	110
1853,	67	44	111
1854,	64	38	102
1855,	78	12	90
1856,	70	6	76
1857,	83	3	86
1858,	73	2	75
1859,	85‡	–	85
1860,	–	110§	110
1861,	–	96§	96
1862,	74‡	–	74
1863,	130‡	–	130
1864,	107	10	117
1865,	125	12	137
1866,	93	8	101
1867,	88	3	91

* Reported in First Annual Report of Registrar (1849), taken from previous records.

† Includes 366 deaths from ship-fever at Deer Island, City Poor-House and House of Industry.

‡ Typhoid and typhus together.

‖ Note to Annual State Registration Report for 1849:—"This county (Suffolk) was never complete till 1849, the city of Boston never having complied with the law prior to that time."

§ Taken from State Registration Reports for 1860 and 1861, no municipal report of the Registrar having been made in those years. The figures for these two years include all of Suffolk County, and also include "cases of infantile fever classed with those of typhoid, relapsing and other continued fevers under one name—typhus."

Table of Deaths from Typhoid Fever in Boston, compared with a fixed number of the living in each year.

YEAR.	Population.	Deaths.	Deaths to 10,000 living.
1846,	116,865	133	11.4
1847,	122,346	300	24.5
1848,	127,827	288	22.5
1849,	133,308	149	11.2
1850,	138,788	104	7.5
1851,	142,693	170	11.9
1852,	146,598	110	7.5
1853,	150,503	111	7.4
1854,	154,408	102	6.6
1855,	158,313	90	5.7
1856,	162,218	76	4.7
1857,	166,123	86	5.2
1858,	170,028	75	4.4
1859,	173,934	85	4.9
1860,	177,840	110	6.2
1861,	180,735	96	5.3
1862,	183,630	74	4.0
1863,	186,526	130	6.9
1864,	189,422	117	6.2
1865,	192,318	137	7.1
1866,	195,214	101	5.2
1867,	198,110	91	4.6

An examination of these tables shows that typhoid fever is less fatal now than when the registration of the causes of death was commenced, and it shows a very marked diminution in the number of deaths in the years following an abundant supply of pure water. This may be attributed not only to the improved character of the drinking-water used by the people, but also to the constant flushing of the drains and sewers, by which much material which had previously been retained there in a state of putrescence, particularly during seasons without rain, was washed into the sea.

But the statistical evidence is not all which goes to prove the effect of Cochituate water on typhoid fever in Boston.

Inquiry has been made of our oldest physicians for their opinions on this point, based upon professional experience. Their testimony is almost unanimously to the effect that since the period when pure water was introduced, typhoid fever has been less frequent and less severe. The following extracts from the reply of a gentleman whose professional experience extends over a period of fifty-five years will be read with interest:—

"I have noticed since the time when Cochituate water was introduced that typhoid fever has been less frequent in proportion to the population, and generally mitigated in its character. * * * * * * * At the early part of my professional life, fever of a severe type was quite common, much more so than it was a few years later, and the cases were of a more serious character than at any subsequent period. * * * * * Cases of what is now distinctly recognized as 'typhus' were not then uncommon; they are now comparatively rare. Mild cases of 'typhoid' fever, such as have of late been most common, do not readily arise to the remembrance of the practitioner of that early time. * * * * * From the period referred to down to the time of the introduction of Cochituate water, fevers had still been gradually lessening in frequency and severity. It has been noticed that since the introduction of pure water the diminution of typhoid fever, both in frequency and virulence, has been still more marked."

How much of this improvement is due to better drinking-water, and how much to the better drains and sewers, how much to the free supply of water to wash away impurities, how much to the more rational treatment of fevers, our correspondent thinks may not be determined; but,

"Taking into view the fact that fevers have become comparatively less frequent, and much mitigated in severity since the introduction of pure water, the inference is just that much of the benefit derived is due to this cause."

With regard to the second inquiry of the typhoid circular, we are unable to answer with precision. Wells being disused in Boston, the height of water in the soil is not as readily ascertained as in the country.

The extension of land over the sea which has been going on in Boston for many years has been attended with a contest between the waters of the land and the waters of the sea for possession of the subsoil, a contest in which fresh water speedily triumphs. Soon after the filling is made the water is salt, then brackish, and, in a few months, fresh.

This has been the case wherever the filling has been made with porous material. The pressure of rain-water received upon the surface of the new-made land, combined with that flowing down from more elevated points, is evidently greater than the pressure of the water of the ocean, so that we meet even now on the gravel-filled territory south and west of the Public Garden with fresh water below the level of the tide, just as is described by our correspondents of Cape Cod and Martha's Vineyard.

The reply to be made to the third and fourth questions of the circular of May 1st, must be that in Boston the ordinary collections of filth found in crowded localities, in dirty houses, in foul privies

and stables and streets and alleys,—the combination of all those impurities which make Boston stink in the month of August, does not especially invite epidemics of fever. The city is more free from typhoid than the country. We have to pay the penalty (and a heavy one it is) in other forms of disease, but not in this.

A very considerable number of the cases of typhoid treated in Boston during the autumn originate in the country and at seaside places where families from the city have passed the summer.

We cannot assume to fully explain the comparative exemption of Boston from typhoid, but there are some things in this connection which, whether they are causes or coincidences, it is well to remember.

The drinking-water is, beyond all question, free from contamination by putrefying material. The soil is well covered by pavement, or by macadamized streets, or thoroughly packed gravel, and is not often disturbed to any great extent.

People do not live in large numbers on the ground floor; a very great majority sleep in rooms twenty feet at least above the ground. Cellars are very seldom used for the storage of vegetables. Pigsties are unknown. Drains and sewers receive the liquid slops of the kitchen and convey them to the sea. Liquid filth is not often poured upon the ground.

The older parts of Boston are more filthy from overflowing, neglected and broken privy-vaults, than any country place can possibly be; but they do not contaminate the drinking-water.

The influence of obstructed drains and of emanations from untrapped sinks and water-closets is as evident in Boston as elsewhere. In Kearsarge Avenue, Boston Highlands, is a block of three brick houses, built seven years ago. They are situated on the slope of a hill, with good natural facilities for drainage. The neighborhood is an excellent one. In these three houses there occurred in the autumn of 1868 eleven cases of typhoid fever; and in the adjacent houses, whose rear came against the block, there were two cases.

Of the thirteen cases, two were fatal. One of the attending physicians states that at his suggestion the common sewer of the block, which was laid along the rear of the houses and into which the drains of the houses emptied, was examined. It was found to be effectually obstructed by a mass of rubbish, including crockery, tinware and ashes, so that the fluids accumulating above this plug had over-flowed, saturating the ground beneath the houses and infecting also in some degree the soil beneath the adjacent block. The workmen engaged in taking up the drain and repairing it were nauseated and were obliged to desist at intervals from their work.

The physician stated further that the typhoid epidemic in that neighborhood subsided soon after the nuisance was abated.

The following history of a single case of typhoid fever has been furnished for publication at our request, by an eminent practitioner. Although not referring directly to the special object of this inquiry, it throws so strong a reflected light upon the causes of disease, and is itself so striking an example of the value of hygienic treatment, that we cannot doubt the propriety of reporting it in this connection:—

"A young and apparently vigorous man, between twenty and thirty years of age, a butcher by trade, was attacked with typhoid fever in the autumn of a few years ago. I saw him soon after the fever commenced, and attended him through the whole of it. He was a bachelor and occupied a good sized chamber in the second story of a house in Pleasant Street. The chamber was lighted by two windows, and furnished with an open fire-place in a chimney.

"The fever was a mild but unmistakable typhoid, which developed itself normally. The patient had a daily febrile exacerbation, a hot skin, thirst, a slight diarrhœa, rose-spots and the like. There were no violent symptoms, and consequently no indications for active treatment. In fact I saw no reason for the exhibition of drugs, and therefore gave none. His skin was bathed two or three times a day with tepid water. A slight wood fire, just enough to insure ventilation, was kept in the chimney of his chamber, and one of the windows raised a little. He was allowed to drink as much water as he chose, iced or not according to his taste. In like manner the covering of his body was regulated by his sensations; when hot he had only a sheet over him, at other times he required a light blanket.

"As soon as the fever was sufficiently developed to render its character clear I advised his landlady to inform his family, who resided at a distance from the city in Vermont or New Hampshire I think, of his illness, and to add that he was not dangerously ill.

"Directly the news reached his family a maiden aunt and sister were despatched to the city to take care of him. Alarmed by the name, typhoid fever, they hurried to Boston and reached his quarters one forenoon, just after I had made my customary visit. My patient was in the condition described above, comfortably sick, with a pulse of about eighty and without delirium. They were frightened and astonished to find their relative, who was sick with typhoid fever, so poorly cared for. Guided by their theory of the proper treatment of fever, they proceeded without informing me to reform matters.

"They pinned a blanket over each window so as to exclude the light, and closed the open window so as to shut out the noise of the street. A fire-board, or chimney-board I believe it is called, which had been removed from the fire-place was replaced, and an 'air-tight' stove, in which a fire was built, was substituted for the open fire. In order to make him sweat he was packed in two or three blankets, and the diaphoretic process encouraged by copious libations of herb tea. The fact that no medicines were given they regarded as an unpardonable neglect on the part of the attending physician,

but until they saw me were content to make up for this neglect by giving the hot teas just referred to.

"When I reached the house on the next day for the purpose of visiting my patient I was met at the door by the landlady who informed me that he was much worse. She gave me no hint, however, of the transformation in his surroundings that had taken place. I went up stairs and was surprised beyond measure at the change. I found a dark room, filled with a hot and foul atmosphere. The odor was of that offensive sort that the chambers of the sick are too often charged with. But the greatest change was in the sick man whom I had left so comfortable the day before. He was wrapped in blankets, his skin was dry and very hot, his tongue dry, his lip cracked, his eye wild, his pulse one hundred and twenty, and he was so restless and delirious that it was all his attendants could do to keep him in bed.

"The maiden aunt approached me and introduced herself and niece. She said she came to nurse her nephew, and had found him with open windows, exposed to noise and currents of air, drinking cold water as freely as he chose, and taking no medicine. These evils she had endeavored to remedy, but in spite of all her efforts he had grown rapidly worse. She said this with such downright honesty and sincere simplicity that I could not be provoked with her. I asked her to step into an adjoining room, and told her that unless everything about her nephew was arranged just as it was before she came, I should take no further care of him. As she hesitated a moment, I added, 'he will probably die left as he is, and it is for you to take the responsibility of following your own course or mine.' We returned to the sick-chamber. I remained and saw her with trembling hands and doubtful looks remove the blankets from the windows and from the bed. The air-tight stove and the chimney-board were taken away. A fire was built in the chimney and a window opened. I gave the sick man a tumbler of water, which he drank as if he were quenching an internal fire. All this they bore in silence, but when I called for a large tub, and made preparations for a bath, they remonstrated. A bath, and particularly a cold bath, would kill him.

"Remonstrances were unavailing, and they were compelled to acquiesce. My patient got a cool affusion by pouring water all over him. He was then put to bed, lightly covered, and soon went to sleep. By night his condition had considerably improved, and on the next day, twenty-four hours later, his fever assumed its previous mild type. His pulse was about eighty, and his head tolerably clear. He made a satisfactory convalescence. His relatives returned home in due time, and if they are alive I hope they are the apostles of a rational treatment of typhoid fever."

Brimfield.—An experience of twenty years has satisfied our correspondent that the most prolific sources of typhoid fever are found in the conditions mentioned in the third and fourth questions. "Many and many a time" he has traced such connections.

"We have every year a few cases of typhoid fever, and in nearly every family where it has occurred in the past three or four years, I have thought it originated from decaying vegetable matter."

Bridgewater.—"Whenever I have had several cases of typhoid fever in one house or neighborhood I have usually found what I considered the cause; either a wet cellar with decaying vegetables, or a sink-drain running into a pool near the house for the purpose of making compost."

Brewster.—"Typhoid fever has in some instances seemed to be caused by bad drains, but in my opinion by far the most fruitful cause has been the emanations from low, wet, swampy grounds, and fresh-water ponds, of which the bottoms were partially exposed from evaporation in dry seasons."

Cambridge.—"I have not been able in the cases of typhoid fever I have seen to trace any connection between this disease and impurity of water, of soil or of air. I have seen the disease alike in the dwellings of the rich and of the poor, of the clean and of the filthy, in wet and in dry places. The only endemic of typhoid fever which we have ever had occurred some twenty years ago, and the cases were almost exclusively on the comparatively high land between Cambridgeport and Old Cambridge, in families provided with the comforts and, a large part of them, with the luxuries of life, in houses comparatively well ventilated, and containing nothing so far as could be discovered, to render the air impure."

Chatham.—"This town is situated at the heel of the Cape on a peninsula almost devoid of trees, and is almost continually swept by the wind. We have very few cases of typhoid, and those of a mild type. The disease is much more prevalent in East Harwich where my practice extends. That locality is well wooded, and there is much more fresh water. While practising in Wareham (head of Buzzard's Bay), I noticed the same peculiarity, which strikes me as being more than a coincidence. Most of the typhoid cases were in the adjoining town of Carver, which is interior, and where there is much fresh water and low meadow land; Wareham being unlike it in these respects."

Conway.—"According to my observation, *putrid air* from decaying vegetable matter and foul sink-drains, with poorly ventilated sleeping room, constitute the most frequent cause of typhoid fever."

Chester.—"Typhoid fever prevailed here constantly in 1858 and 1859 without regard to water or weather."

Concord.—"In two epidemics of typhoid, soil in the immediate vicinity of the cases was broken for the first time, and exposed to a hot and dry air in a season of drought. In one instance, in making a railroad a knoll was cut through and the dry, gravelly soil was carried forward to fill a depression by the side of a street occupied by several good houses. The work was done in the winter and spring. The subsequent autumn was dry and hot and the springs very low; fever occurred in nearly every house—from two to five cases.

"In another instance extensive stone quarries had been laid open, and large quantities of earth exposed for the first time. The wells were very low so that it was difficult to obtain water. In August, September and October following, many of the workmen, mostly stout men from the country, were affected with severe typhoid. I had ten cases at one time, some lasting six weeks, but all recovered."

Coleraine.—"I have failed in most cases, but not always, to observe the connection referred to in question 3.

"With regard to question 4, negligence in these respects, is common among the rural population; but often the most negligent families seem to escape. Still I have often found such carelessness in infected families. I think the bottoms of mill-ponds in times of drought are fertile sources of typhoid fever."

[NOTE.—See also "Health of Towns."]

Dartmouth.—"My experience is that typhoid fever prevails in its most malignant form in low, damp places, where rooms are but poorly ventilated, where cellars are overflowed, where drains are bad, and where decaying animal and vegetable matter is found in and around the building."

Dennis.—"In eighteen years' practice I have met with many cases of typhoid. They have generally been imported. For instance, a father, who is master of a vessel, comes home with typhoid fever, and there is a pretty good chance for it to go through the family, let the subsoil water be high or low.

"In a neighboring town I have seen well marked instances of typhoid caused by partially draining a swamp.

"Our people every year put fish under corn-hills, and it makes a most dreadful fetor for about ten days, but no disease results therefrom to my knowledge."

Dudley.—Our correspondent has observed an apparent connection between wet cellars and the habit of sleeping on the ground floor, and the origin of typhoid fever.

Erving.—"Last August three persons in one house died of typhoid fever. The cause seemed to be a pool of stagnant water and decaying vegetable matter within thirty feet of the house."

Essex.—Typhoid fever was prevalent here in the summer and autumn of 1869, but no cause could be distinctly traced.

Fall River.—"In the autumn of 1867, about forty cases of typhoid fever occurred in one locality where a large number of houses had been recently built, and filled with French Canadians as soon as completed. The water was from wells just dug. Every form of filth was thrown on the ground, and left exposed. This locality is now well sewered and is as free from disease as any part of Fall River.

"The following year a large number of cases of fever occurred in another neighborhood. Here also the houses and wells were new. An examination of the premises showed that the pipe leading to vaults containing refuse matter and filth of all kinds, was so arranged as to allow the foul air to escape directly into the houses. These pipes were properly trapped, and no cases of typhoid have since occurred.

"In both years referred to (1867 and 1868) the typhoid fever in town was confined almost wholly to new comers, to the French recently from Canada."

Franklin.—"We have but little typhoid fever. What seems strange to me is the fact that I see so many places where the sink water is deposited at the back door, and no apparent evil results follow. On the other hand I have had cases in families where the surroundings seemed conducive to health. I remember one instance six or eight years ago in which three families, comprising about sixteen persons were affected. Of this number twelve had the fever. The fathers of these families were brothers and lived quite near each other. I could discover no local causes. Those who were in the sick-rooms during the night took the fever, while a man-nurse, who remained only during the day, escaped. It was cold weather, but the nurse kept the windows open while he was in the house. These families had been previously well, and have continued well ever since, living in the same houses and with the same surroundings."

Fitchburg.—Water from wells in the valley occupied by this town is believed to be deteriorating from the increase of population, but no connection with typhoid is remarked by our correspondent. "An epidemic of typho-bilious fever occurred in 1865 when our wells were very low and continued till the November rains of that year." Soil, very variable in different localities,—some clay bottoms, some gravel, a good deal of rock, very little alluvial soil. "The Nashua River makes a serpentine course of ten or eleven miles in crossing the town which is six miles wide. My experience of thirty-two years in this region leads me to believe that we have more of typhoid fever on the high land or on the *summits between the water-sheds*, than in valleys or low lands."

Great Barrington.—"Whenever called to a case of typhoid fever, I have been able to trace the origin to some local cause in every instance." The above opinion is the result of twenty years' practice. Our correspondent is very decided in the expression of his opinion that foul soil and air and water are the causes of typhoid fever.

Grafton.—Our correspondent finds no difference as regards the causes of fever between the water of springs or wells and other sources, provided the water be of good quality, but remarks, what others have also observed, that patients suffering from typhoid often manifest a singular longing for the water of springs or wells in the vicinity of a former residence.

"I have noticed that a connection between typhoid fever and foul soil seems to exist; occurring more generally and assuming a more grave and malignant type under these circumstances, sometimes seizing a whole family, or even many families in a neighborhood, until the cause was abated. Many cases, not only of typhoid, but of dysentery (the latter, perhaps, especially,) have originated in foul soil and putrid air within the range of my practice."

Gloucester.—"I have always found typhoid fever most prevalent and malignant where the air has been rendered impure from the causes enumerated in the fourth question of the typhoid circular." [See also "Health of Towns."]

Hadley.—"Some twenty years ago I attended upon a family consisting of a father, mother and nine children. The mother and eight children had typhoid fever. After the first case of fever, four of the children, who showed no signs of illness, were placed in

as many different families, three of them being at a distance of two or more miles from their home. They, however, exhibited signs of the disease as soon as those remaining at home. As to the cause,—there was a slaughter-house at the distance of one-third of a mile from the house. The proprietor had spread the accumulation of his hog-yard with the butchers' offal upon a low, wet piece of ground lying between his buildings and the house of his neighbor. Whenever the north-west wind blew, the stench was perceptible to all in the vicinity. I noticed it many times in riding by. I have always believed that the fever must be attributed to the influences proceeding from the manured field above mentioned.

"Thirty years ago, a clergyman built a house in this town, with a fine cellar extending under all portions of it. He dug a well under the L portion. The well was not covered, and consequently the floors of all the lower story were kept damp by evaporation. The sink-pipe ran down near the pump into a wooden spout, which passed under ground to a closed box, situated about fifteen feet from the cellar wall. The foul air from the box and drain had no means of escape, excepting through the drain back into the cellar. The cellar was also used for the storage of whatever vegetables were used in the family. The windows of the cellar were never taken out. There was no escape for the moisture and foul air, except by permeating the floors. Water stood in drops upon all the timbers and boards.

"After a few months' residence in the house, the minister's wife died, of fever so far as I can learn. He soon married again, and within one year of the death of the first wife, the second died from, as I understand, the same disease. His children were also sick. He lived in the house about two years. The next occupant was a man named B——. His wife was desperately sick. A physician then took the house. He married, and his wife died of the fever. Another physician was the next occupant, and he, within a few months, came near dying of erysipelas. All this while matters had remained as before described, with reference to ventilation. A school teacher then rented the house, and tore up the closed box, but did not cover the well. This was about eight years after the building of the house. The sickness and fatality were so marked, that the property became unsalable. When last sold, every sort of prediction was made as to the risk of occupancy, but by a thorough attention to sanitary conditions, no such risks have been encountered.

"For the following circumstances, I take popular statements as the only evidence available. In North Hadley is an extensive mill-

pond. About thirty years ago the water was drained off to make repairs during the summer. It had islands and many shallow places, on which there was a rank vegetable growth. There was consequently much decaying material from the exposure. Typhoid fever swept through the village, causing great mortality. No one here has ever questioned the fact that the draining of the pond was the cause.

"It is a fact, that within forty or fifty years, many ponds have been permanently dried up in the roads, and instead of there being a frog-pond in every farm-yard, there are now almost none. The drainage is greatly improved, land better cultivated, and sanitary laws better understood and acted upon.

"In those days the 'fall fever,' as it was called (really typhoid), was the dread of the people. One fall is spoken of in which there were twenty-two deaths from this cause, in an area of territory occupied probably by not more than twelve hundred people. Dysentery of a very fatal type was also a very common disease. Typhoid fever is now comparatively rare."

Holyoke.—"In the fall of 1869 cases of typhoid were quite numerous, but the disease prevailed in a greater or less degree through this entire valley, and could be traced to no special cause or causes. This year (1870) only three cases have come under my own observation. They were persons of exemplary habits, lived in the most healthy parts of the town, remote from each other, and I confess myself at a loss to know why they should have been ill at all."

Harwich.—In this town the condition of some seventy-five to a hundred acres of territory lying south of and in close proximity to the principal village, has been the subject of much discussion. It was formerly covered with water to a depth of several feet, and known as "Grassy Pond." Of late it has been almost completely drained during a part of the year, for the cultivation of cranberries, to which use about one-third of it is now devoted, the remaining two-thirds being covered with rank grass. A ditch and many holes remain, partially filled with water. [This place was visited by the Secretary July 25th, 1870, at the request of the selectmen of Harwich.]

Our correspondent says of this place and its effects on those dwelling on its borders: "I have always freely expressed my opinion with regard to the cause of the sickness in the neighborhood of 'Grassy Pond.' It is due to the decomposition of vegetable and animal matter. My attention was called to it some ten

or fifteen years ago, when the cranberry culture commenced, and when the pond was partially drained. Since that time sickness has, on the whole, increased in this vicinity, though not in every year. In 1863, there were about forty cases of typhoid dysentery within one mile of the pond, on the northerly side, including in the area, I should judge, not more than thirty or forty families. At that time not a case of the kind occurred in any other section of the town."

Another physician of the town has given similar testimony.

Huntington.—Our correspondent states that typhoid fever is a very frequent disease, and is decided in the expression of his opinion that it may very commonly be traced to some local foulness as the cause. "In the winter of 1868 I attended six cases of typhoid in one house, on high and dry ground with good cellar and good water. I found no privy. The family for two years had made use of the vacant lot in the rear of the house. No other cause for the disease was found; this seemed sufficient."

In a subsequent letter it is stated that "persons coming here from other places have seemed most sure to have the fever, unless protected by a previous attack; from this I judge that there is some local cause operating here. Our village is low. Two large streams (the south and west branches of the Westfield River) pass through it. The fever, however, seems equally prevalent on the hills for miles around as in the valley. The autumn and winter of 1868 gave me fifty cases, about equally divided between the villages, and the country five miles around. I have usually found, on close investigation, some immediate and direct local cause on or about the premises. Our cellars are many of them damp, sinks foul, and the people blind to the importance of these things. In 1867, in one house where there were nine cases of severe fever, a drainage from a wet-sink, into which all the slops were thrown, had established itself to the well from which the water for drinking and cooking was obtained. In nearly every case some local cause was ascertained, in some instances apparently slight.'

Hingham.—Typhoid fever is a disease of very rare occurrence in this town.

Hudson.—"We had a great number of cases of typhoid fever and typhoid dysentery six years ago, caused, as I suppose, by the decaying vegetable matter from a pond in the village, which was drawn off for the purpose of repairing a dam.

"Wherever I have seen typhoid fever in ill-ventilated rooms, or where the surroundings were foul, the fever has been of a low type, and has proved more fatal."

Hanson.—"I have found typhoid fever to be more prevalent in low, wet and foggy locations, and have sometimes been suspicious of the influence of foul cellars."

Hyde Park.—"Typhoid fever, a disease of common occurrence. Have found foul privies on the premises, where repeated and fatal cases of typhoid have occurred, but have not always so found them. Do not think connection can be traced with other causes mentioned in third question."

Kingston.—"We have but little typhoid fever. No epidemic for twenty years. I had five cases in one neighborhood last year in houses supplied with spring-water. Also two other cases in a house with a wet cellar and near a mill-pond, which had been drawn off."

Lenox.—"Nearly every case of typhoid in my practice can be traced to foul privies, decaying vegetable matter, obstructed drains, or wells below the level of cess-pools, privies, or manure heaps."

Leominster.—"Typhoid was prevalent in the fall of 1869, but except in four families the cases were isolated, scattered over different parts of the town, and without known or suspected cause. In the first of the excepted families there were five cases in a family of eight. In the second, four miles from the first, there were four cases in a family of six. In the third, far removed from either of the others, there were seven cases in a family of ten. All three of these families were farmers; the water used was derived from open wells at some distance from the houses, with no possibility of anything running into them, as the ground around the wells was higher than the surrounding surface, and far removed from any contaminating cause existing upon the top of the ground, such as privies, drains, manure-heaps, &c. The water in the wells was rising, and remained higher than usual on account of the heavy and then recent rains. The houses of these three families were all on elevated ground, with no wet or swampy ground in their vicinity. The fourth family consisted of boarders, forty-one in number, operatives in a woollen mill. Twenty-two were within a few days seized with typhoid fever. The cause of the disease in this instance was apparent. *The drain of the sink had found access to the well.* A new well was dug and no

more cases occurred. For the last thirty years I have observed that typhoid fever prevailed here most extensively in those years in which the summer was dry, followed by a wet autumn."

Leverett.—Typhoid fever is an annual epidemic in the village, which is built on the banks of a rapid stream, having five dams supplying power to as many mills. The cause of so much fever in the village is not, in the opinion of our correspondent, stagnant water, but more probably a cider-mill, where the pomace from the apples is heaped up yearly and left to ferment, so that in the hot season, with a west wind, the odor can be perceived throughout the village. There is now a great mass of this pomace which has been accumulating for years. There is a good deal of fever in this section of country, but more in the village than in all the rest of the town.

"An epidemic of typhoid occurred here some time since from the flowing of a meadow, and then draining it. After it was drawn off every family living around the pond had typhoid fever. I have observed that if one member of a family is attacked some of the others are almost sure to be if the rooms are small and ill-ventilated. Among the causes of typhoid which I have observed, may be mentioned, slops thrown on the ground, putrescent puddles from sinks under the window, rotting vegetables in cellars. Typhoid is often caused by decaying vegetation, ceasing after a hard frost. I have had cases occur after digging muck in swamps, and working around ponds that were drying up.

"Two years ago three boys went in swimming in a foul pond of water. In just two weeks afterwards they were all taken down with severe typhoid fever."

Littleton.—"I have observed that typhoid fever has assumed a graver type when the cases have been near a slaughter-house. It seemed to be aggravated by the impure air arising from the decomposing animal matter."

Lawrence.—"Many cases of typhoid fever occur in overcrowded and ill-ventilated sleeping-rooms, as well as from all the causes mentioned in the fourth question."

Lowell.—"In reply to your questions concerning typhoid fever, I would say that no opportunity is afforded in this city for observing the difference in the prevalence of the disease between houses supplied with water from wells and those supplied from springs or ponds. All our water is from wells. This water, in the thickly

settled localities, is highly charged with impurities. The worst example is a well on the corner of Lowell and Dummer Streets, which is exposed to the washings of streets, and the drainage of vaults and sewers, filtered through a few feet of earth. A gallon of this water contains fifty-two grains of inorganic and twenty-five grains of organic residue, but in spite of this impurity it is not unpleasant to the taste, and is used by at least one hundred families. Works are now being constructed to supply the city with pure water.

"During the year 1869 there were thirty-four deaths from typhoid fever in Lowell; a greater number than in any year since 1857. With a view of answering your inquiries, I have looked up the recorded residences of the deceased, and found, contrary to my expectation, that this disease was less fatal in the filthy than in the well-ordered districts, as will be seen by the following statement:

Number of deaths in worst localities,	5
of deaths in localities somewhat better,	5
of deaths in well ordered sections,	24

"In Lowell, Winter, Williams and Middle Streets, regarded as the filthiest in the city, there were no fatal cases. If one may deduce any conclusion from the mortality in Lowell in a single year, it would appear that though filth, putrid air and impure water are active agents in causing scrofulous, tubercular and bowel diseases, they have but little if any effect to cause typhoid fever.

"The greatest mortality from this disease is in August and October. The greatest number of deaths occurred between the ages of twenty and thirty, Recent residents seem to be most susceptible to attacks of typhoid fever. I have in mind instances where it seemed to extend itself by contagion."

In a subsequent letter, our Lowell correspondent says: "You request me to give the population of the districts referred to in which the number of deaths from typhoid fever differed so greatly. It is difficult to estimate the number of persons living in these localities. Some streets are wholly good, bad, or indifferent in a sanitary point of view, while others may have two or even three of these conditions in different parts of their extent.

"The only convenient way that suggests itself to me is to divide the population into nationalities. Lowell has a population of about forty-two thousand. The Irish and those of Irish parentage number fifteen thousand strong, and there are three thousand French Canadians. The Americans and a small number of English, Scotch

and English Canadians constitute the remaining twenty-four thousand.

"Now the Irish and French Canadians, as a rule, crowd into the bad and indifferent localities, and almost wholly disregard hygienic laws. The Americans, on the other hand, as a rule, live in the well ordered sections and observe hygienic laws, but notwithstanding this, and also the fact that the mortality from all diseases for the year was forty-three more among the former than the latter, we find, what appears to me singular, that the mortality from typhoid fever among the Irish and French Canadians was only seven (five in the bad and two in the indifferent localities), while among the Americans it was twenty-seven (twenty-four in the good and three in the indifferent districts)."

In addition, we have the following history of typhoid in Lowell in 1870:—

"In reply to yours of the 6th ultimo requesting me to give the mortality in this city from *typhoid fever* during the year 1870 to the first of December, observing the same order regarding locality and nationality as that adopted in a communication respecting the same disease in 1869, I would say that I find the whole number of deaths from the disease to be 31; of this number 16 were in good, 4 in bad and 11 in indifferent localities or sections of the city. Among the American population (including the few English, Scotch and English Canadians) there were 15 deaths; 11 in good and 4 in indifferent locations. Among the Irish and French Canadian population and those of Irish and French Canadian parentage there were 16 deaths; 5 in good, 4 in bad, and 7 in indifferent locations. During the year 1870, to the first of December, there have been 879 deaths from all diseases and causes. Of this number 356 occurred among the American and 523 occurred among the Irish and French Canadian population, an excess among the latter over the former of 167 deaths. By the above statement it will be seen that typhoid fever has caused 4.21 per cent. of the deaths among the Americans and only 3.06 per cent. of the deaths among the Irish and French Canadians. Or to state it in another way, typhoid fever caused one death in every 23 deaths among the American and only one in 32 deaths among the Irish and French Canadian population."

Lexington.—"I had eight or ten cases of typhoid fever in 1865 in a circle twenty rods in diameter. I noticed that within this area sinks disgorged their filth on the surface of the ground close to the houses, the privies had no vaults, the excrement lying on the sur-

face of the ground; a pigsty was an invariable appendage to each house or shanty, and often the house formed one side of the sty; the weather was unusually warm, and the stench horrid. At the same time a large piggery from twenty to forty rods distant was daily replenished and enriched by loads of slaughter-house offal. The air from it at times was almost insupportable. Sleeping and other rooms were small and badly ventilated."

Leyden.—Typhoid fever a rather prevalent disease. Our correspondent regards it as due to a specific poison in the atmosphere at certain seasons of the year, "coming we know whence," rather than to sanitary neglect. He has, however, frequently observed the disease to prevail where animal and vegetable matter was in a state of putrefaction, as near foul privies or over damp cellars holding decaying vegetables.

"In one family six persons had typhoid fever and three died. In this instance the privy was found to communicate with the well."

"The soil of the town, is, on the whole, rather dry than wet; surface uneven, and much exposed to north-west winds. Typhoid prevails more on the low than on the high ground."

Marshfield.—Our correspondent at Bridgewater writes as follows concerning a malignant form of fever which he witnessed at South Marshfield in 1842, and of which he thinks no account has ever been published:—

"In the spring or early part of the summer of 1842, Daniel Webster, who lived three miles from South Marshfield had a large surface of ground, in the vicinity of his homestead, covered with fish (some hundreds of cart-loads of menhaden), which were left to decompose during the warm weather. I was living in Hanover at that time, but was frequently called to the neighborhood in question. South Marshfield is in a hollow, bounded on the north-west, west and south-west by hills covered with forests which extend back several miles. In going from Hanover I passed through this forest and emerged from it on a high hill overlooking the village. From this hill I noticed a most offensive stench which continued several weeks. There was no unusual sickness in Mr. Webster's neighborhood, but in South Marshfield a very malignant form of typhoid fever began to prevail about the middle of July. Some of those attacked died in forty-eight hours without reaction. Many of those who lived a week had gangrenous spots, which sometimes became sloughing ulcers an inch in depth. A few recovered under the

influence of tonics and stimulants in very large amounts, but they made slow progress to health.

"In the latter part of August there prevailed a malignant form of erysipelas, with rapid and extensive sloughing of the skin."

Our correspondent has no doubt that these diseases, appearing as they did to leeward (by prevailing wind) of the great accumulation of putrid fish, were due to this cause.

Martha's Vineyard.—Our information from this quarter is of an interesting character. The following remarks are from a medical man, a former resident of the island: "The eastern end of the island is sandy, chiefly drift. There are very few wells, and the people, in general, drink rain-water from cisterns. At the western end the land is high and hilly, and the water used is mostly from wells." [The division of these sections is indicated in a pen-and-ink sketch enclosed by our correspondent by a line running nearly north and south through the middle of the township of Tisbury. The island of Martha's Vineyard is thus divided into two parts of about equal area.] "It is my opinion, gained from several years' residence, that cases of typhoid fever are as ten west of the line to one east of it."

Our regular correspondent at Holmes' Hole writes as follows: "There is, without doubt, some influence or other which regulates the prevalence of typhoid fever upon this island, resulting in an almost complete absence of the disease in the eastern end, and confining it to the hilly part in the north and west. This latter region is almost all of it in the town of Chilmark. Now the population of Chilmark is to the rest of the county as one to four,* yet there is said, by the physicians who practise there, to be more typhoid there than in all the rest of the county. In the village of Holmes' Hole an epidemic of typhoid and dysentery occurred seven years ago, and all the fatal cases were on the same side of the same street. From all that I can learn, the conditions of the case are these: all the wells in the eastern part of the island are on the level of the sea. Those near the water's edge ebb and flow with the tide. In those further back this phenomenon is not observed, yet in these it is necessary to dig down to the sea-level in order to obtain water. As the land rises it is difficult to obtain water from the deep wells. This leads to the discontinuance of their use, especially in Holmes' Hole, where cisterns for rain-water are substituted. In Chilmark, the hilly region, spring water and well-water are almost universally used. The wells are on a higher level than the sea, caused no

* One to six, according to Census of 1865.—SEC'Y.

doubt by the clayey substratum which forms basins for the collection of the water. On the side of the street referred to in Holmes' Hole, where typhoid and dysentery prevailed, every fatal case was in houses supplied with wells. No cases, fatal or otherwise, occurred in houses provided with cisterns, the water of which was used for drinking purposes. The only case of typhoid I have known since I have been in practice in this village was imported."

Our correspondent in West Tisbury practises also in Chilmark, the adjoining town, and may speak for the western end of the island. He says: "Probably more cases of typhoid occur in the town of Chilmark than in all the rest of the county." [This fully confirms the opinion above given by a former resident of the island.] "I have imputed this to the character of the subsoil, which is clay, retaining the moisture, and also to the greater fertility of the soil. Typhoid is comparatively rare in the eastern part of the island, where the soil is light and sandy and the vegetation sparse.

"In several instances I have known typhoid to follow the taking down and repairing of old houses while the family still lived in a part of them; but in a majority of cases I have been unable to assign any cause. The inhabitants in the region of my practice use either well or spring water,—generally the former. Occasionally a family will use cistern water in winter. I have never observed any connection between typhoid and foul air from decaying animal matter, as fish spread on the land for manure, but I have thought the disease prevailed more extensively where vegetation grew luxuriantly and where large amounts were left on the ground, in the fall, to decay."

[The condition of the camp-grounds at Martha's Vineyard in the summer of 1869 was such as would lead an observer to predict that sooner or later they would be visited by pestilence. They certainly violate the plainest teachings of hygienic common sense. The buildings are so close together that ventilation is obstructed; they have no drainage; there is no adequate provision for the removal of refuse; the privies and wells are everywhere in close proximity, and most of the houses are so shaded by trees that direct sunlight can hardly ever reach them.—SECRETARY.]

Mendon.—Our correspondent, who has practised in this town during the past forty-four years, reports that during that period he has not met, in the usual circle of his visits, with more than (by estimation) one hundred cases of typhoid fever. "Many years ago, during the autumn, all the members of a family, six in number, had typhoid fever, mostly of a mild type. Three or four other families,

within sixty feet of the first, did not have a single case. The family in which the cases occurred was remarkably neat, and from garret to cellar everything, in a sanitary point of view, was well cared for. In the autumn of 1836, while the only physician in Milford was sick, I had the care of some thirty cases of typhoid in that town. I attributed its prevalence at that time to the fact that a large, shallow pond which had for a long time been covered with water was, during that year, bare. The Milford cases were all confined to the valley in which the pond was located, and no cases occurred beyond the summit level on each side of it, east and west (the stream running south)."

Medway.—"There is a large swamp near the centre of the town, but the land around it is generally somewhat elevated, and but few people live near its level; those who do I think are more subject to fevers. We have had no general epidemic of typhoid since 1839. At that time the most severe and fatal cases were observed to be in houses with bad drainage and exposed to the influence of decaying animal and vegetable matter."

Montague.—"Typhoid fever occurs where the surface water has drained off or dried up, leaving vegetable matter, which at other times is covered, exposed to sun and air. My observation leads me to believe there is a close connection between this disease and foul soil and putrid air. It prevails more in the lowlands about swamps and stagnant water than in the upland."

Middleton.—Thirty years' practice. Typhoid a rare disease. When it has appeared, it has been by single cases, without any apparent cause. If the greatest care was not given to ventilation, it has spread by contagion.

New Marlborough.—"I have no doubt that foul soil from privies and pigsties is often connected with the development of typhoid fever, although I have not met with such cases. I have observed instances in which I thought the disease was due to rotting vegetables in cellars, and to old cisterns with stagnant water, and I make it a point when I have cases of typhoid to look out for these causes of impurity, and to remove them when they exist."

Newburyport.—"Water supplied from neighborhood wells. A pump on the highway affords water for twenty or thirty families. Some old estates have wells on the premises. No connection

observed between this water supply and fever. During the war, have seen typhoid originate in camps from unventilated quarters and decomposing vegetable matter."

Nantucket.—Our correspondent recalls two cases of typhoid in one house some years ago which were apparently caused by a mass of turnips which had been left in the cellar and forgotten until their presence was made known by the smell of decomposition.

Northbridge.—The disease not a common one here; but the old village of Northbridge Centre, situated upon a hill, is thought to have comparatively more cases than the factory village, situated on a stream and in a valley.

Newton Centre.—Typhoid is rare here. "In ten years I have seen not more than twelve cases, and two-thirds of these occurred among the theological students, on the top of a very high hill, where the subsoil is *tough marl;* the other four were at the base of the same hill, where the soil was swampy and the house-sills decayed. Improvement in two of these cases was very marked after removal to higher and drier land; two other cases were fatal. The village lies on a plateau, one hundred and fifty feet above Charles River; has most excellent surface drainage, and is *underlaid with an unfathomed bed of loose gravel.*"

Orleans.—"Typhoid fever was first known in this town and vicinity in the spring and summer of 1837. It was then epidemic and severe, and pervaded the whole town. I could never trace the cause to bad drinking-water, decomposing matter about the premises, bad ventilation or any local filthiness; but in my opinion, the atmosphere of the whole place had become contaminated, tainted, *poisoned* by the noxious exhalations from low, marshy grounds surrounding the numerous inlets from the sea (forming ponds of mingled fresh and salt water of greater or less extent) with which this town is sadly cut up. Typhoid fever has stuck to us ever since 1837 in the summer and autumn, but most prevalent and most severe in dry seasons. The towns on the south side of the Cape were comparatively exempt from fever at the time it first appeared in Orleans, and for several subsequent years; but of late, sporadic cases are quite common. The town of Chatham is geographically very like the town of Orleans, but there are counteracting climatic influences."

Oxford.—Opinions based upon a practice of forty years.

Our correspondent says: "I have very frequently observed a

marked connection between typhoid fever and exhalations from privies, cess-pools, pigsties, foul cellars, &c. These, together with filthy and unventilated places of living and sleeping, have appeared to me to be the cause of typhoid fever in a great majority of cases. So firm is my belief of this that when I meet with a case of this fever not readily traceable to some of these causes, I infer that the truth has not been told me, or that my perceptive faculties have been at fault."

Pittsfield.—Has good reason to believe in the production of typhoid fever by local causes. In the summer of 1864 this disease appeared among the pupils of the Maplewood Institute. Among seventy-seven young ladies occupying the premises, fifty-one were attacked, and thirteen died. Three servants also died. A thorough investigation of the causes of this pestilence was made by three professors of the Berkshire Medical College, whose report was published. The water used at the school was brought by an aqueduct from hills outside the town, and was of unquestionable purity. During a few days in July this water gave out, and the supply was from a well in the neighborhood used by several families, none of whom suffered from illness. There seems to have been no well on the premises. The committee were of opinion that water had nothing to do with the disease. A few rods from the school was a barn, whose yard was a basin holding foul water, in which swine wallowed, emitting an offensive odor. The kitchen drain discharged its contents on the surface of the ground. The vaults of the privies were shallow, filled to overflowing, and emitted an odor very offensive, and at times pervading the whole building. The grounds were excessively shaded by trees, and the sleeping-rooms were so shaded by piazzas and vines that the direct rays of the sun could not reach them. These were the causes of the fever. At the same period there was no unusual sickness in Pittsfield, and since the removal of the causes above described, the Maplewood Institute has been exempt.

In December, 1835, typhoid fever appeared in Pittsfield in a family of about forty persons, a boarding-school for boys. The head of the school and four boys died. Eight or ten other cases recovered. The surrounding community was healthy. In this family the water used was from a well under the wash-room. The drain from the wash-room was obstructed, and the foul water found its way under the floor and into the shallow well. The well was closed, and the family supplied with water from another source, and the fever subsided.

The published report of the board of health of the town of Pittsfield for the last year shows the most intelligent interest in the prevention of disease, and the citizens of that town may be congratulated on having such faithful guardians of the public health in the gentlemen who constitute the board.

Since the above was written, our venerable correspondent at Pittsfield has been removed by death. The town authorities have promptly appointed a successor, who writes to us concerning typhoid in 1870. "A case of typhoid fever under my care in September appeared to be caused as follows: The man was engaged in laying drain-tiles in a meadow, with two others. They all drank while at work from an old well in the meadow, supplied only by meadow water. This case of fever was severe, but recovery followed. It so happened that the other two men engaged in the same work, both came to me, one a few days before, and the other a few days after the case of fever occurred, with violent headache, general pains, and nausea. Both immediately recovered after a vigorous catharsis, followed with quinine; but I attributed their symptoms to the poison of the meadow well.

"Another physician of Pittsfield reported to the Medical Society in September two cases of typhoid occurring in the immediate neighborhood of an overflowing and very foul cesspool from an hotel. The same physician also reported in August a case of typhoid in a very old house, under which a cellar was being dug, disturbing a great quantity of rotten timber.

"Another physician of Pittsfield, had three cases of typhoid in July, in a house built upon a meadow, through which, and near the house, flows a sluggish brook, which receives all the sewage of the town. This house is also surrounded on three sides by stagnant ditches, foul with sewage. Most of my own cases have been of obscure origin."

Our correspondent states that typhoid has been unusually infrequent in Pittsfield during the past summer, and adds: "I am quite sure, and it is the general impression here, that our comparative freedom from fevers during the past summer, has been largely due to the activity of the town board of health, in causing the immediate removal of every removable nuisance or source of sickness. Our board of health has now acquired so established a character that our 'notices' have been immediately complied with. In only two cases has it been necessary to remove a nuisance and collect charges of the owner."

Provincetown.—"In a practice here of more than thirty years,

typhoid has been a rare disease; never epidemic. I have had sporadic cases which were aggravated by ill-ventilated rooms.

"Our wells rise and fall with the tide at all seasons, and afford very pure water."

The following letter was received from Provincetown in December, 1870, in reply to a question whether putrid fish had ever been known to cause typhoid fever in that town:—"I came to Provincetown in December, 1839. During that year typhoid fever (as it was called) had prevailed epidemically, and was very mortal. It had subsided so that I did not see any of the cases. During the winter much was said about the offal of fish, left on the shores unburied, as the cause of the fever of the preceding season. At the town meeting in February, a very efficient man was chosen as health officer, who kept the shores clear the following year, and there were but few cases of typhoid. The shores have been kept clean from that time to the present, and typhoid has diminished. For fifteen years past typhoid fever has been almost unknown among us. Now and then a sporadic case occurs; whether this is owing to our keeping the shores clean, or to the inhabitants taking better care of themselves, the fact is that typhoid is so rare with us that we do not look for it unless it is imported, while Truro, Wellfleet, Eastham, Orleans, Chatham, are not so exempt. We shall keep our shores free from filth for general convenience, and if by so doing we keep off disease, we are by so much the gainers. We have swamps which have been in a great degree converted into cranberry bogs, by being filled up with sand, and this I think, has had some influence in making this a healthy spot. I should say that in the towns above referred to, typhoid fever cannot be referred to decaying fish left on the shore, for they are not exposed to this danger as we are. I still believe that decaying vegetable matter and impure water have more to do with the production of typhoid."

Pembroke.—"Some of the most severe and fatal epidemics of typhoid dysentery I have seen occurred in very dry seasons, in the vicinity of large ponds, or low marshy places usually overflowed, but then exposed by prolonged drought."

Rowe.—Our correspondent has had an experience of thirty-eight years' practice of medicine in this town, and answers our first and third questions in the negative.

Typhoid has seldom originated here, but has often been imported. "In one instance we had an endemic fever, arising from the flowing of an artificial pond. It did not seem to be pure typhoid, so I

called it the 'pond-fever.' All the cases recovered. Some years ago a case of typhoid was imported into the neighboring town of Monroe, from a region where fever was prevalent. It was communicated to the attendants and visitors, and was of a severe type, causing many deaths. It was a strictly contagious disease.

"On another occasion, in a high and healthy part of the town, a family of four persons came down with the fever. They were neat and tidy people, but I always thought in this case there must have been some impurity about the premises. All recovered."

Randolph.—"Typhoid usually occurs among us from August to November inclusive. Occasional cases occur during an open winter, or in the following spring. Its time of prevalence generally coincides with the season of low water, but it ceases for the most part with the coming of dry, cool weather, whether the autumn rains have been heavy or light."

Rutland.—"Although I have uniformly tried to discover the connection between cases of typhoid fever and its alleged causes, my experience has been negative rather than positive. There are several neighborhoods in the region of my practice the atmosphere of which in the warm season is often rendered very offensive by the offal and pigsties of slaughter-houses, and the draining off of two or three large reservoir ponds used for the storage of water for factories. This has been especially true this season, but typhoid fever has never prevailed in these localities more than in others; and never at those particular times and places when and where they would naturally be predicted.

"For many years after my first residence in this town (1839), probably a dozen, I never saw a case of typhoid fever on the summit of the hill on which the centre village is located, unless it was imported. A very few since that time have originated there. The hill is of about eleven hundred feet elevation above tide-water, and has no wet subsoil. In digging wells which are the only supply for water, a ledge is always encountered, at a depth of eight, ten or twelve feet. The base of this hill has not had the same immunity from this disease. About a mile to the north of this hill is another of about the same height, on the summit of which there have been, until within a few years, two families. In both of these houses typhoid fever used to be of very frequent occurrence. In one of them, which was burned down six or eight years ago, it was rare that a hired man or a female domestic escaped the disease the first autumn. I never could quite satisfactorily explain the prevalence

of typhoid on one of these hills, and the comparative immunity of the other, unless it was because one was wet soil and the other dry."

Rockport.—"Although dysentery and typhoid fever are seldom absent during the latter part of summer and the fall, they have only ouce presented a sufficient number of cases to warrant being called 'epidemic.'

"While the typhoid epidemic was prevailing there appeared to be nothing unusual in the state of the atmosphere; but during the epidemic of dysentery, the weather was unusually hot and dry, many of the wells were dry, and rain was withheld until far into October. In neither instance could the disease be traced directly to any decomposition of animal or vegetable matter, but in both seemed to spread from communication with the sick. Within a few years, however, I have noted cases of typhoid which seemed to be connected, in one instance with vegetable, and in another with animal decomposition. In December, 1868, I was called to see two cases of typhoid in a room underneath which was stored a large quantity of turnips and cabbages which were rotting, and the odor from which was extremely unpleasant. Soon after two other cases occurred in another family in the room immediately over the first, while in the opposite end of the house, also occupied by two families, but not directly over the vegetables, no case occurred. There was but one other case in the neighborhood about that time, and that was in the house adjoining. During the hot and dry weather in the latter part of the summer of 1869, some fifteen cases occurred in quick succession in tenement houses owned by the 'Rockport Granite Company.' Most of them were under my care. These houses were situated on a high and broad ledge, with very little soil on its surface,* to absorb the semi-liquid contents of a half dozen privies and pig-pens which flowed out over its north-east declination towards the sea. The stench was almost intolerable. On my representing to the clerk of the company the possible effect of such a state of things, the premises were freely strewed with quicklime, and subsequently covered with dry coal ashes. The adoption of this modification of the dry earth system was soon after followed by copious rains, which washed the surface of the ledge and carried into the sea much of the filth which had accumulated during the summer. No new cases occurred, and I am led to believe the means used, along with the atmospheric changes prevented the spread of a serious disease."

* Compare with remarks of Worcester correspondent on "ledges."—SEC'Y.

Reading.—"Three years ago there prevailed here an epidemic of typhoid dysentery, beginning in the middle of August, and lasting about six weeks. There were eighteen deaths. One, a young girl, was living in a high, dry, healthy spot, a half mile from the rest. All the others were in or near a circumscribed locality, low, level, wet; the ditches full and overflowing, the wells also, and some of the latter I know were offensive. The season was unusually wet. The rest of the town, and the adjoining towns were remarkably healthy."

Rochester.—"Forty years ago typhoid prevailed extensively in this town. I was then in practice, but I cannot from memory throw any light on the causes. A few years since I knew a whole family sick of typhus from a very foul cellar. One died."

Sutton.—In illustration of the effects of drinking-water made foul by decomposing organic matter, the following instructive facts are related by our correspondent:—

"A large house in this village is supplied with water from a well in the front yard, three rods from the house. Connected with the house is a barn without cellar, some three rods from the well. In December, 1868, a trench three or four feet deep was dug from the well to a point near the middle of the barn, where a pump was set and a pipe connecting it with the well was laid in the trench; after which the earth, which was in large frozen chunks, was filled back into the trench. In the house was kept a boarding-school for boys, of whom there were ten or twelve. Three little girls were also there, aged twelve, eight, and three years, belonging to the family of the owner of the house; there were therefore fourteen or fifteen children who drank from the well. The oldest boy was seventeen or eighteen years old, while the others were of ages from ten to thirteen.

"Everything went well until after the thaws in February and March, 1869, when the water had a decided taste and smell of stable-manure. March 26th, one of the boys, thirteen years old, was seized with typhoid fever; another, twelve years old, on the 31st of March; another, eleven years old, April 2d; another, ten years old, April 4th, and another, twelve years old, April 9th. April 20th, one of the little girls (eight years old) was seized. Each of these six children (all of whom finally recovered) drank water with their meals from the well in the yard. Some of the older boys drank coffee in the morning and tea at night. The manner in which these children were attacked, and the fact that this

house had been free from typhoid fever for many years, and the water heretofore known to be very pure and wholesome, leads me to the conclusion that the use of the water thus impregnated was the cause of the disease occurring where and just at the time it did. My theory is that while the ground, manure, &c., under the barn, were frozen, the water was all right; but when it thawed, and the previously frozen filth leached through the soft and loose earth along the track of the pipe into the well, the effect of the poison was felt most perceptibly by those who used the polluted water most freely, while those who used it less freely escaped entirely."

Salem.—"In one season, typhoid fever prevailed extensively along the banks of the North River, but of late years it has shown no more preference for that locality than for other parts of the city. Cases seem to be quite equally distributed about the city, without regard to soil or water supply, whether from wells or aqueduct.

"It has been a matter of surprise that the old mill-pond has not been a more fruitful source of disease than it has hitherto been, as its surface is covered, during the hot season, with decaying vegetable matter."

Somerset.—Our correspondent thinks that the influences of marshes, and not those referred to in questions 3 and 4, are concerned in the cause of typhoid fever.

Shelburne.—Our correspondent reports twenty cases of typhoid, of a severe type, which occurred in 1868, in a little hamlet of eight houses at the confluence of the North and Deerfield Rivers. With one exception these houses were clean, of rather recent construction, and free from any discoverable cause for the disease.

Shirley.—"I give you the history of typhoid fever as it has occurred in a certain house in this town; not as throwing light on the questions you have submitted, but from the regularity of the intervals being very peculiar.

"1st. In 1818, when four deaths occurred.

"2d. In 1836, three cases and one death.

"3d. In 1856, six cases and three deaths.

"On neither of these occasions was the disease specially prevalent in this vicinity. The house is in a valley on a small, sluggish stream, a tributary of the Nashua River. No other local cause was ever recognized. The commencement of the disease each year was in August."

Somerville.—The most severe epidemic known here in fifteen years occurred in July and August, in a section of the town sloping to the south, with decidedly dry soil and with good well-water. "I regard bad air as one of the principal causes of this disease. The most unhealthy condition we ever experience is to live in a house with a wet and imperfectiy drained basement. Large and well-ventilated sleeping-rooms are indispensable to health, and equally so for the recovery of the sick."

Shrewsbury.—"I have observed for some years an apparent connection between foul soil (and consequently air) and typhoid fever. I have often believed a vile sink-drain, or rather sink-pool, to be the cause; also, butchers' slaughter-yards, the foul effluvia from which have seemed to favor typhoid and dysentery of a low grade."

Spencer.—"Have observed instances where typhoid fever seemed to be directly caused by foul air from pigsties and privies. Five cases at an isolated farm-house, in 1867, apparently due to the foul air from a pigsty. The disease more prevalent in houses supplied with water from wells."

Stockbridge.—"A few years since there were several tanneries on the river just above us, from which tons of filth were cast into the stream to be borne away or scattered over the low lands, as chance or flood might direct. The result was a dreadful stench and a prevalence of typhoid fever, causing numerous deaths. The tanneries were finally removed, and water introduced from a neighboring hill through iron pipes; and, with a purer air and delightful water, typhoid fever has almost become unknown. Nearly all the people used wells formerly, while we now have a fine reservoir."

Stow.—[See remarks on diseases most prevalent in towns.]

Southampton.—"Have observed typhoid fever to prevail with great severity in a neighborhood where a mill-pond had been drawn off, leaving the debris at its bottom exposed to a hot sun, generating putrid air."

Stoneham.—"I think there is a connection, and an intimate one too, between typhoid fever and foul soil. Several cases could be distinctly traced to this source, in the form of filthy privies and pigsties."

Springfield.—"In three-fourths of the cases of typhoid fever

coming under my observation, in this city, during the past eight years, *foul soil* from privies or defective drains was present, and in, I should say, one-third of the cases impure privies were on the premises. Most of my cases of typhoid have been found in ill-ventilated apartments and overcrowded tenement-houses. In a large number, I could trace the cause directly to impure air from decomposing animal matter. In several families where it prevailed the cellar was inundated with sink-drain water.

"Since the more general introduction of water from springs, by the Springfield Aqueduct Company, there has been a diminution in deaths from typhoid. Of late the drainage has also been better. There has been no epidemic of typhoid during the eight years of my observation; but the cases have been sporadic, springing up here and there wherever some focus of infection has seemed to be produced by decomposition."

Sunderland.—"Typhoid fever has only once prevailed here as an epidemic during the past twenty years. It was then (1851) as I doubt not, due to imperfect drainage. The season was very dry and hot. I then called the attention of the town to what I regarded as the cause. The drains were opened and have since been kept open."

Our correspondent in reply to the third question of the typhoid circular says: "In several instances, the connection has been of such a nature as not to admit of a reasonable doubt. In one case a whole family was down from the influence of a neglected cistern."

Sterling.—Our correspondent reports that typhoid has prevailed in this town and vicinity to an alarming extent during some past seasons but not within the period of his own observations.

Swampscott.—Three cases of typhoid are reported as occurring at about the same time, and among the crew of the same schooner. They had been exposed on board to the emanations from a quantity of putrid clams which were very offensive.

Taunton.—"The disease has been observed to be prolonged and convalescence made tedious when sinks and cess-pools and cellars were neglected.

"It is not unusual to meet with cases of typhoid in boarding-houses of unskilled laborers. In such cases I have sometimes found them in an attic room with three beds, two men for each bed, one window in the room and the upper sash fixed."

Truro.—"There has been a good deal of typhoid fever here the last year, and I have observed that nearly all the cases have been around a low, marshy meadow over which the tide used to ebb and flow, but from which the salt water has been excluded of late by a dike built about a year ago."

Tewksbury.—Our correspondent states that some years ago, while he was in charge of the Monson State Almshouse, typhoid broke out in a detached building occupied by idiotic and epileptic patients, and was arrested by clearing it out, and having it thoroughly cleansed. Typhoid rare in Tewksbury, either inside or outside the State Almshouse.

Upton.—"I think I have observed a connection between typhoid symptoms in fever and other diseases, and foul air and soil from want of proper drainage, unventilated sleeping-rooms, and decomposing substances in and about the houses; and where these conditions of impurity were most obvious typhoid was most severe."

Uxbridge.—Several cases in one house apparently proceeding from filth spread upon the ground from a sink-drain. No new cases after removal of cause.

Webster.—Our correspondent believes that putrid air about houses is a prolific cause of typhoid. "During an epidemic of typhoid fever in 1864 I met with about forty cases in three tenement houses. The houses were one story, with basement tenements, and cellars only in the rear of the basement. All the fever cases occurred in the upper tenements during the summer and autumn. Not a case occurred in the basements until late in winter, and then only two or three mild cases. I attributed this to the exhalations from the cellars and sink-drains having free access to the rooms above, but not to the rooms below."

Ware.—Our correspondent has not been able to plainly trace the origin of fever, in the cases under his observation, to the causes enumerated in questions 3 and 4, except in a young man who had typhoid after cleaning a dirty cellar. While engaged in the work he complained of its making him feel sick, and two weeks after came down with severe typhoid fever.

Instances of apparent contagion from one case to another have been observed.

Westfield.—"Have had a great many cases which could be directly traced to decaying vegetable matter coupled with moisture, in cellars and about houses."

Warren.—"In two instances have thought there was a connection between the disease as it appeared and ill-ventilated cellars."

Winthrop.—One section of this town is, from some cause entirely unknown, very subject to typhoid fever. In one house, built ten or twelve years ago, there have been at different times fourteen cases. Local causes have been often sought for but never found. The situation of this portion of the town is high, and very much exposed to wind. The soil is rather springy and cellars often damp.

Wrentham.—Typhoid fever not by any means a prevailing disease. Twelve cases under observation of our correspondent last September. "In each place where it occurred, the water used by the family was of questionable purity, privies or sink-drains being very near the well. In one instance a direct communication between an obstructed sink-drain and the well was shown to exist." Our correspondent has met with no case of typhoid in families supplied with water from springs or ponds; and in a subsequent letter informs us that he can recollect twenty-four families so supplied; and that there are doubtless others. In some of these families, water is obtained by dipping directly from the spring.

"Little attention is paid to the condition of cellars. Drains and privies are often too near wells. Hence typhoid and dysentery."

West Boylston.—[See remarks on diseases most prevalent in towns.]

Westborough.—Our correspondent believes that he has often seen a connection between typhoid fever and foul soil and air, but limits the connection to cases in which the decomposing matter was under cover, as from cellars, or from drains which had become obstructed and thus thrown their contents back to the cellar or under the dwelling. He is also suspicious of the influence of shade-trees in close proximity to the house.

West Newbury.—"We have had no epidemics of typhoid or typhus for the past ten years,—a few cases arising from local causes. We have had, however, two epidemics of dysentery, ascribable to local exciting causes in connection with continued hot, dry weather. These causes were bad sink-drainage, filthy cess-pools and slaughter-

houses not properly disinfected, the waste being matter thrown into pig-pens to be partially eaten by pigs, and the rest to become decomposed, and render the air impure and noxious for quite a distance from them."

Wales.—"In years past have observed the connection between typhoid fever and foul soil and putrid air from dirty cellars and unventilated sleeping-rooms."

Watertown.—"In connection with inquiries 3 and 4, I will say that in all instances in which I have seen a succession of cases of typhoid fever in one house or in a small locality, I have diligently searched for some local cause of contamination, but have never, with a single exception, been able to discover any satisfactory one."

The "Boston Medical and Surgical Journal" for February 4, 1869, gives a history of some cases of fever originating in Watertown, which are doubtless the exception to which our correspondent refers. Five members of a family were successively attacked with typhoid fever in the autumn of 1868. A foul smell had been perceived soon after the first case occurred, and the drain was taken up and examined, *but nothing wrong was discovered.* Some weeks later, a *more careful* search being made, it was found that an opening existed between the drain and an air-box which conveyed air from without to a chamber behind the kitchen range, and thence to the bath-room and other parts of the house. *A third search* being made still later in the season, another opening was discovered beneath the wash-room floor. The workman who took up the floor was so overpowered by the effluvia that he had to be assisted to the outer air.

Winchester.—"I had last fall two fatal cases of typhoid in the same house, where the water came from a cistern exposed to contamination from a leaky sink-drain. At the same time the vault was overflowing, though not in a position to make it probable that its wash affected the cistern. They died of distinct blood-poisoning, but the other members of this family were not attacked with typhoid, although one was threatened with it.

"There is a tenement house in this town occupied by seven or eight Irish families, where for the past three years the sink-drains emptied into the cellar, whither also the wash of the privy worked after every rain. The well is in this cellar. Now I have known but one case of typhoid in that house. There have been several cases of diphtheria, two or three of which were fatal. I have made

various efforts to get the drains in this house put in order, but can effect nothing. It amazes me that there is not more severe sickness there, but it stands at a distance from any other house, and the children live out of doors, while awake."

Walpole.—"Typhoid fever not often met with. There is, however, one house in which it has occurred, in 1856 and 1858. It is situated on the north side and at the foot of a high hill, and is surrounded from the south to the north-west by low, swampy land.

"Some years ago, an epidemic of typhoid and dysentery occurred among the residents near a mill-pond which had been drained for the purpose of making repairs. Typhoid has more frequently occurred in the south part of this town (where there is low, damp land bordering a stream), than in any other part."

Waltham.—"A brook in this town flows about six months of the year; at other times there is only a ditch of stagnant water. It is just back of an Irish settlement. Typhoid usually commences here, and is more prevalent and more severe than in any other part of the town."

Williamstown.—Our correspondent reports an outbreak of typhoid of a severe type in August, 1868, in tenement houses on the grounds of the Williamstown Manufacturing Company. These houses (eighteen in all) are in two rows, placed back to back, with a space of thirty-three paces between them. In this street or passage, common to them all, are placed the privies; there is also a gutter which makes pretence of carrying away the water, but fails of doing it. Close by the front of the row, facing south, is a well; at this well washing was done, and when the sickness broke out the water was falling. The well had a pump and a platform about six feet square. At one side the water had worn a hole, and it is probable that the foul water from washing was drained from this hole into the well.

"About twenty cases of fever, with several deaths, occurred in the tenement houses using this particular well, and it was in the section of the tenement houses, of both rows before referred to, nearest this well that the outbreak occurred. Typhoid fever did not exist in other parts of the village at the time."

Westminster.—"A large proportion of the cases of typhoid fever observed here, have occurred in persons living in the valleys, or in persons who have been at work in low lands, getting

swamp hay. There are several places in the town where the land is flowed early in the season, and then the water drained off to allow a crop of grass to grow. I have attributed typhoid and dysentery, in part at least, to the exhalations arising from these places."

"Typhoid-dysentery prevailed last year in a particular locality. Five houses containing ten adults and fifteen children were affected, and not an individual escaped the influence in a greater or less degree. The cause was evidently the exposure to the sun's rays of the bottom of the pond. The prevailing winds were from the pond to the houses in question; houses still nearer the pond, but to windward of it, escaped entirely. After rain had fallen to fill the pond again the sickness disappeared."

Wilbraham.—"We have had an epidemic of typhoid among a few families living within a third of a mile of each other on the same road. Only one, or at most two in each family escaped its influence. The soil is wet, retaining water a long time; somewhat elevated, yet near the highway is a swamp, from which arises quite a stream of water. At one of the houses I learned that the sink-drain was broken, and that an unpleasant odor arose from it. From others the sink water was allowed to flow over the surface of the ground. The families are all in good circumstances, not exposed to want, or given to luxuries."

West Roxbury.—Typhoid fever rarely seen. In cases which have occurred, no satisfactory cause could be discovered.

Worcester.—Our correspondent has collected the opinions of several leading practitioners in his city.

One says: "Typhoid is a comparatively rare disease among us. It has occurred, however, in all parts of the city; quite as often in high, airy, well-ventilated houses, as the reverse. I have never been able satisfactorily to trace the disease to any particular cause."

Another expresses essentially the same views, and adds: "I have often remarked the strong predisposition to the disease in certain families."

Another says: "The worst cases have been on high ground, and under apparently the best hygienic influences."

Another believes that foul soil and foul air are causes of typhoid.

Another says: "When I first came to Worcester there was a row of privies in Maple Street, which drained into the wells near by, and typhoid fever raged until the use of the water was discontinued. I have found more of the disease on hills where, under

the soil, was a *ledge*. My opinion always has been that, in such places, the water became retained in cavities in the rocks under the soil, and was the cause of the disease."

Another says: "I think we have had less typhoid in Worcester since the introduction of 'city water.' When the disease raged so fearfully in Auburn a few years since, the wells were dry and the ponds very low. I thought that perhaps there might have been miasma from the ponds as a cause, but those living around those ponds were free from the disease. It occurred almost entirely on the hills. I have always thought that its increase was from contagion."

Yarmouth.—Our correspondent regards true "dothinenteritis" as one of the exanthemata or eruptive fevers; not influenced by the conditions enumerated in questions 3 and 4.

Shaker Communities.

We have endeavored in various ways to obtain definite information concerning typhoid fever among the Shakers in Massachusetts. Their habits of extreme neatness render them in this respect an exceptional people, and their experience, if it could be obtained, would be of great value. Our efforts have been only partially successful. The following is all we have been able to gather from reliable sources.

The *Lebanon Community* (just over the State line) numbers 400, of whom one-fourth are under eighteen, and there are none under five years of age. During the past year two cases of typhoid have occurred among them; one of these is said to have been contracted elsewhere. Twelve years ago, a woman employed in the dairy died from a violent form of typhoid, at a time when the dairy drain was obstructed. Since that time the drainage has been made very perfect, and fevers have been infrequent. The Shaker village is more elevated than the village of Lebanon, where typhoid is frequent. Epidemics of fever have sometimes visited the Shakers, having been severe in former years when drainage was bad. Epidemics of typhoid in the Shaker village, and in the village of Lebanon, have never been known to coexist; but sometimes when it has subsided in the one, it has immediately broken out in the other.

The *Hancock Community* numbers 150, of whom 25 are under eighteen, and none under 5 years of age. Their phy-

sician has been connected with the community for 43 years, and states that he has no recollection of a case of typhoid fever among them, although bilious and gastric fevers are not uncommon. [Physicians will see from this statement that it is a question of diagnosis.] He also states that since the partial drainage of Richmond Pond, which is less than a mile from the Shaker village, sickness in their community has increased.

It will be evident from all this, that the statements which have been sometimes made by tourists and sensational writers, that typhoid is an unknown disease among the Shakers, are incorrect.

Such is the evidence we have been able to collect concerning the causes of typhoid fever in Massachusetts. The more difficult task still remains of endeavouring to draw from it some consistent and reasonable conclusions. Let us try to find some continuous thread of probability, if not of proof, by following which a clearer idea of the relation of cause and effect may be finally reached.

There are some essential facts which do not appear in the evidence presented. First, as regards the season in which typhoid prevails.

The registration of deaths shows that it is a disease most rife in the months of autumn and early winter, but that no season is exempt. The observations of physicians would show that, when prevailing epidemically, it is found to begin usually in the months of autumn, and to continue till December, but rarely later. Individual cases (sporadic) are met with in every month.

During the five years 1865–1869, deaths are distributed among the months in the following order:—

Deaths from typhoid fever in Massachusetts arranged by months. Five years, 1865–1869.

January,	363	July,	332
February,	316	August,	596
March,	338	September,	814
April,	301	October,	973
May,	318	November,	754
June,	249	December,	493

It is to be remembered that the origin of the disease must be transferred to the month preceding that in which death occurred.

We may say then that while typhoid occurs in every month of the year, the causes, whatever they are, which produce it are in greatest activity in August, September and October.

The liability of the sexes seems to be equal.

Age is an element of more importance. The registration returns are not to be depended on to determine its prevalence in infancy, since custom has permitted deaths from infantile fever (whatever that may be) to be incorporated with typhoid. It is well known and will be generally admitted that while rare, the disease does occur in infancy, and also at advanced age. It is, however, specially a disease of adolescence and early maturity, the maximum of deaths in any decade appearing between the ages of twenty and thirty.

Before attempting to examine the alleged causes of typhoid fever in Massachusetts, let us first see what has been the prevailing belief on this subject.

The late Dr. Nathan Smith, of Hanover, N. H., whose opinions upon all medical questions have had great weight in New England, is one of the few writers of preceding generations who have examined the causes of this disease. His observations were made, for the most part, on cases which he had seen along the Connecticut River, from Hanover to Middletown, during the years between 1787 and 1821. He believed typhoid fever to be propagated by contagion, and gives many examples in proof; also that, like other contagious diseases, it rarely affects the same person twice. Dr. Smith says:—

"I have not observed that situation has any influence either in producing or preventing this disease. It affects alike persons living on mountains and in villages, on plains and the banks of rivers, and on the borders of lakes and stagnant ponds. And I have not perceived that occupation or habits of life make any difference in their liability to receive this disease, nor has it in this country been confined to the poor and filthy; but affects nearly alike the rich, the poor and middle classes. * * * * It seems to possess a migratory character, and travels from place to place, and after remaining in one village for a longer or shorter time, as from one year to two or three, it ceases, and appears in another. * * * * * The fact of the absence of typhus in a large section of country for an interval of

more than twenty years would lead us to doubt the possibility of its being produced by accidental causes; for in such an extent, and among so many people, it is impossible but that some of these circumstances should have occurred, and the disease of course be produced. Besides, if it can be communicated from one person to another, it has a specific cause, and I know no disease that arises from a specific cause that can be produced without the agency of that cause."

Dr. Smith's views with regard to contagion have certainly not been universally, perhaps not generally, received, but what he says about the migratory character of fever, and its disposition to attack all classes of persons without regard to location or habits of life, has, until recently, been generally believed by the medical profession in New England ever since his time. It is doubtless the present opinion of a large number of our correspondents who have replied briefly to our questions, and among them are some of the most intelligent observers of disease among us. This view is expressed by our correspondent at Cambridge unreservedly, and by many others with certain qualifications. Our correspondent at Leyden says that at certain seasons "it comes, and we know not whence."

But the disposition to pry into all the secrets of nature which marks the present period, and in which the medical profession has been foremost, has led to more careful inquiry and comparison with regard to the whole tribe of epidemics. Men of research and of great ability have probed the history of the epidemics of the middle ages and have made it appear more than probable that their virulence, if not their origin, was due to the filthy habits of the people. Special epidemics among the inferior animals have been studied with great success during the past twenty years and their causes shown. (See Parliamentary Reports on Cattle Plague; also Pasteur's investigation of the cause of "Pebrine" in the silk-worm.) Diseases of men previously quite as obscure in their causes as typhoid fever is to-day have been made plain and intelligible. (See modern investigations of Trichina disease in Germany and England, and the report on Charbon by Dr. Nichols in the present volume.)

The medico-scientific world is now profoundly impressed with the idea (we may almost say the belief) that zymotic diseases,

including all the so-called epidemics, are propagated by distinct particles, conveyed by air or by water. We need not call them "germs" or even seeds, or by any other name which would lead us into a labyrinth of speculation, involving doctrines of spontaneous generation and mysteries as yet unfathomable. It is sufficient to call them "contagion-particles" as is done by Dr. Burdon Sanderson in a recent paper of great interest published in the "Twelfth Report of the Medical Officer of the (English) Privy Council." No man has yet seen the distinct thing which, once introduced into the living body, produces such disturbance as to cause the symptoms of scarlet fever, or measles, or typhoid, but its real existence may be assumed from its observed effects, just as Leverrier assumed the existence of the planet Neptune before he saw it, or as chemists assume the existence of an elementary substance before its separation from its compounds.

The conditions and surroundings of typhoid fever in the period of its commencement are now more closely watched than ever before. The general result of this study on the opinions of the medical world has been to encourage the belief that in some way typhoid fever and filth stand in certain relations. There are as we before said many disbelievers, and they are men whose opinions cannot be lightly put aside. But out of this very widely diffused impression have grown various hypotheses, all based upon the propagation of typhoid fever by a poison as definite as that which causes vaccine disease, and all seeking to explain the nature of this poison and the manner of its introduction into the healthy human body. They may be thus divided.

First.—Propagation by drinking water made foul by the decomposition of any organic matter whether animal or vegetable, and specially by the presence in such water of excrementitious matters discharged from the bodies of those suffering from typhoid fever.

Second.—Propagation by air contaminated by any form of filth, and specially by privies, cess-pools, pigsties, manure heaps, rotten vegetables in cellars, leaky or obstructed drains.

Third.—Emanations from the earth, occurring specially in the autumnal months and in seasons of drouth.

We propose to see how far the evidence collected in Massachusetts corresponds with these hypotheses.

The first is essentially English. In reading the reports of typhoid epidemics occurring in England of late years, it so far predominates over all other imaginable causes that we are led to believe either that the English drinking-water must be exceptionally dirty, or that medical observers are unconsciously influenced by preconceived opinions based upon the ingenious speculations of men of ability who have directed their attention to this form of danger.

Dr. Snow of London investigated the causes of the propagation of cholera, and advanced the perfectly original although rather shocking idea that the disease was communicated through the discharges from the bodies of those suffering from this disease thrown upon the ground within the area of drainage of the water supply or into rivers, and thus conveyed in the form of drinking-water to the bodies of those in health. The history of the famous "Broad Street pump" in 1854, and the tracing of cholera from the water supply of different parts of London was strongly confirmatory of this doctrine. Many other observers have transferred this hypothesis to the propagation of enteric fever, and there is much evidence to make it probable. Dr. William Budd of Bristol has been conspicuous in its advocacy. He believes that typhoid fever is contagious, and that the emanations from the sick are the means of its diffusion,—that the affection of the bowels is the specific eruption corresponding to the skin eruption of other contagious diseases, and that the discharges from the intestines contain the specific virulent poison by which typhoid fever is communicated.

If this is so, if the contagion particles are given off in the discharges of the sick, and thus, through the drainage of soil, pollute the sources of drinking-water; certainly, if this mode of diffusing typhoid fever is the one most active, we should expect to find the disease most frequent and virulent where privies and wells are in closest proximity.

There are many large towns in Massachusetts where the surface of the ground is dotted all over with these structures. Lowell, Newburyport, New Bedford, among the most populous places, occur to us as examples. Every one familiar with the State knows that there are a very large number of towns with

a population of from five to ten thousand, compactly built, with no water supply except from wells, and no means of disposing of excrement except by privies, and we know from the registration returns that the people of these towns are more free from the pest of typhoid in proportion to population than the inhabitants of agricultural districts. It is impossible for us to believe that this would be so if water contaminated in the way referred to were the preëminent cause of this disease in Massachusetts. Our Lowell correspondent speaks of a well used by at least one hundred families, containing 52 grains of inorganic and 25 grains of organic residue to the gallon (see his letter for details), and yet the people using it seem to be even less liable to typhoid than others using water of better quality. It is true that he does not give us the experience of a long term of years, but the fact reported is evidently not in contradiction of professional experience in that very crowded city.

The testimony of Boston, as expressed in figures representing deaths from typhoid, ought to be far more positive than it really is, if the drinking-water pollution is the preëminent cause our English friends suppose. Old Boston, previous to 1848, was riddled with wells and privies, side by side, all over its limited and very crowded territory. Sewage contamination of drinking-water was inevitable. The water must have been continually charged with the products of decomposition, and even direct mixture of decomposing animal matter of the most repulsive kind must have been frequent.

Since 1848, the Boston water from Lake Cochituate has been almost as free and abundant as air, and (except, perhaps, from the influence of lead pipe) is of the purest possible quality. Very few wells are now in use, or have been for many years. We do not know of the use of a single one. Here are conditions to test the influence of drinking-water as a means of propagating typhoid, on a grand scale, and, for aught we see, complete. The result seems to be a diminution of typhoid, but in no very striking degree; only such a diminution as might be looked for if the purification of air rather than of water were in question. The sewers are now at all times discharging very large amounts of water, and carrying away from among us impurities which otherwise would linger in the drains. The sewers are more thoroughly washed,—and the people, too.

See also what our Winchester letter says of three years' experience of a foul well supplying water for seven or eight families, and with only a single case of typhoid among them in that period.

The testimony of Worcester and Springfield accords with that of Boston,—that is to say, typhoid is a less frequent disease since the introduction of pure water from without those cities, but the difference is by no means so marked as it would be if contaminated drinking-water were the prominent cause of the disease.

On the other hand, there is satisfactory proof that typhoid fever has been propagated in Massachusetts by drinking-water made foul in various ways. The letter from Sutton is exceedingly clear in its evidence on this subject. The boys' school at Pittsfield is another case in point. See also the Williamstown cases, and the letters from Huntington, Leominster, Leyden and Wrentham. Also the Maple Street cases in our Worcester correspondence.

Some of these are stated in a very general way, but others are so definite as to leave no doubt that the fever-poison was received through drinking-water.

The specific poisons of the zymotic diseases seem to be usually communicated to the blood either through direct inoculation, or as is much more frequently the case by mixture with the air we breathe, through which they are brought in contact in the lungs with the whole torrent of blood rushing through those organs.

Typhoid fever and Asiatic cholera, in so far as they are transmitted through the alimentary canal, are apparent exceptions to this general rule. The most virulent animal poisons of which we have any knowledge, as the snake poisons, syphilis (according to Ricord), glanders and charbon seem to be decomposed, or to lose their virulent properties, or to be unappropriated, when introduced directly to the stomach.

Typhoid poison however seems capable at times of resisting the power of rejection or of change which the stomach so often exhibits when noxious things have succeeded in passing the sentinels of sight and taste. Cases are reported in which it is impossible to doubt that the disease was received by absorption through the alimentary canal, but in the great major-

ity of cases occurring in Massachusetts in which causes can be traced, *air* (and not water) must be regarded as the vehicle.

We come now to the second class of probable causes of typhoid, viz.: propagation by air contaminated by filth.

The evidence is here still more direct. Among the most striking experiences are those given in the letters from Swampscott, Hadley, Watertown, Lexington and Marshfield. The Kearsage Avenue cases in Boston seem very conclusive on this point. Running through the whole correspondence is a recognition, more or less complete, of the agency of putrid air in causing typhoid fever. This faith is not universal, yet it seems quite general in the medical profession. There are those who see it plainly and express it clearly, as in the words of our venerable correspondent at Oxford: "So firm is my belief of this (referring to exhalations from foul drains, cellars, privies and pigsties), that when I meet with a case of typhoid fever not readily traceable to some of these causes, I infer that *the truth has not been told me, or that my perceptive faculties have been at fault.*"

And this leads us to refer to the difficulty which is often encountered in tracing to its hiding place the real or probable cause of the mischief. A man almost instinctively resents the supposition that his premises may be foul. It is a kind of personal affront which a physician may well doubt the propriety of giving on mere suspicion, and without proof. A sensible man should, of course, receive such suggestions in the spirit in which they are offered, but, unhappily, all people are not sensible. But suppose suspicion to be excited concerning the state of a cesspool or a drain, or any other concealed structure, or even one only half concealed, like a privy vault. It is by no means an easy thing to learn their exact condition. The bad smell which they may emit is no certain indication (or, perhaps we should say, no certain measure) of their danger to health. There is reason to suspect that the fever-producing poison is odorless, and that, under certain circumstances, it may be set free from decomposing substances before the foul-smelling compounds of hydrogen come to give us warning.

The danger may be greatest when decomposition is (so to speak) going on under difficulties; when it is impeded, suppressed, or imperfect.

But we shall have occasion to refer to this point again, as it seems to be of special significance.

A physician may suspect a connection between a sink-spout or a drain and the family well, but unless the water is offensive to the taste he finds it very hard to prove it without breaking up the ground with much cost and labor. He may suspect similar connections of conduits for air or water or both combined which would poison a family, but the work of tracing them is expensive and troublesome, and requires time and special skill which may not be at his command. It needs perseverance, and a kind of training to be got only by experience to unearth these half-hidden nuisances. Look at the history of the typhoid poisoning of a family in Watertown in 1868 in the preceding correspondence. The first examination of the drain proved nothing; the second was only partially successful; the third made evident the cause of the disease. If the proprietor of this house or his physician had been content with the first search the record of these cases would have come down to us, like that of so many others, as from "causes unknown and perfectly mysterious."

Our readers will observe that decaying vegetables in cellars are very often referred to in the preceding letters as among the causes of typhoid. It is the custom in the country to store potatoes and other vegetables for winter use beneath the dwelling. There is no reason to believe that this practice is harmful provided the vegetables do not decay, but in our long winters it often happens that partial decay cannot be prevented.

A generalization of many of the probable causes of typhoid referred to throughout this inquiry, is to be found in a single expression of our correspondent in Westborough, who says that he has witnessed a connection between decomposing matter and typhoid when the rotting material was *under cover.* This may be interpreted to mean only that the pestilential atmosphere is thus more concentrated, but we are inclined to believe that it signifies more than this. The air of a whole town like Brighton may be filled for months or years with the stench of putridity,—or, as our Brookline correspondent says, filth may be, at certain seasons, strewn upon the lawns so as to taint the atmosphere for weeks, or land may be covered with decaying fish, and yet none of these things produce typhoid

fever, as a general rule; although we are not unmindful of the apparent exception to this statement in the epidemic following the fish-manuring at Mr. Webster's farm described in our Marshfield letter, and possibly also the fever described in our Provincetown letter. But instances are very numerous in the preceding correspondence where decomposition *under cover*, whether of a cellar or a drain, with a far less noticeable odor accompanying it than is often met with in the open air, or with no perceptible odor, has produced the most disastrous consequences.* Shall we ask organic chemistry to tell us what this certain something is which putrefying material gives forth under such circumstances? As yet we shall ask in vain.

The third class of probable causes of typhoid fever may be considered under the general designation of *emanations from the soil.*

This includes a large number of well-authenticated observations by physicians, in which the fever-poison seemed to spring from the earth beneath or immediately around the persons affected. In some of these cases the ground was polluted by human agency, and in very many others it was only exposed to those causes by which vegetable matter, the natural product of the soil, was undergoing those changes through which it becomes that brown, pulverulent substance known as "humus," or "garden mould."

It is not always easy to separate these two agencies in the production of that condition of the earth with which the origin of typhoid fever appears to be, in some way, intimately connected. In both of them, however, *soil seems at certain seasons to afford the conditions required for the concoction of this subtle poison, and air to be the vehicle by which it enters the human body.*

Our correspondence is full of illustrations of this general fact.

The exposure of the bottom of ponds and reservoirs in the season of heat and the season of decay,—thus charging the air with the products of the decomposition of leaves, wood, and all

* Dr. Benjamin Rush ("Medical Inquiries and Observations") said sixty years ago, in speaking of miasmata exhaled from putrid vegetable and animal matters, that they are *more destructive from articles which have been confined, than from those which have decayed in the open air.* In the same connection he refers to the greater danger from the decay of *salted* than of fresh meats and fish.

forms of vegetable life mingled with whatever the soil may add to these products, or changed, as the soil alone seems to have power to change them—is, of all others, the most frequent single cause assigned for the production of epidemics of typhoid fever in Massachusetts.

It is referred to in our letters from Berkley, Brookline, Brewster, Coleraine, Dennis, Hadley, Harwich, Hudson, Kingston, Leverett, Mendon, Montague, Pembroke, Rowe, Southampton, Stow, Truro, Walpole, Waltham, Westminster and Hancock.

From Orleans and other towns on Cape Cod, we have similar testimony with regard to ground partially covered in ordinary seasons with mingled fresh and salt water, but occasionally exposed to the action of sun and air.

The effect of turning up soil in causing epidemics of fever is attested by our correspondents in Brookline (both as regards that town and Brighton), Concord and Leverett, and it may be questioned whether the cases described in our Pittsfield letter, as occurring to men who were engaged in laying drain-tiles in a meadow, may not fairly be classed with them.

The Ashland epidemic breaking out in houses just built upon land newly cleared and covered with decaying leaves may also fall in the same category. These cases, especially those of Concord and Brookline, surely point to some poison coming directly from the earth.

The singular difference in the liability of the people of Martha's Vineyard to suffer from typhoid fever according as they may happen to live in the eastern or western half of the island, will arrest the attention of all who are interested in the study of the causes of disease. It seems extremely improbable that the different water-supply can explain it, as is suggested by one of our correspondents on the island. The portion supplied by wells is in this respect like almost every other district of the same size in the State. There is however a broad distinction between the eastern and western half of the island in the character of the geological formation, and of the superficial soil. Professor Hitchcock's geological map of the State (1841) represents Martha's Vineyard in two portions, divided by a line running north-east and south-west, and corresponding very nearly with the line referred to in the preceding letters as

marking the boundary between the typhoidal and non-typhoidal portions of the island.* The western section is geologically unlike any other part of Massachusetts, and is described as corresponding to the deposit in Europe long known under the name of Plastic Clay, but now as a part of the Eocene Tertiary. It crops out in the cliffs of Gay Head, forming from the various colors displayed a remarkable and picturesque object well known to geologists. The eastern section is quite different, being composed like Cape Cod of diluvium or drift.

But the peculiarities of the surface are probably quite as important for our present inquiry as the underlying formations which are the special subject of geological research. In the western, or typhoidal section of Martha's Vineyard there are hills and valleys with abundant vegetation on a rich surface soil, overlying a stratum of clay. In the eastern, or non-typhoidal section there is a blank, level, barren expanse of sandy drift, perfectly pervious to water at all depths.

This combination of rich surface soil with a subsoil of clay has been elsewhere remarked in our letters as seeming to coexist with typhoid. The high hill described in our letter from Newton had a "subsoil of tough marl," while the village had an "unfathomed bed of gravel." Fever occurred on the hill, and was almost unknown in the village. See also the letter from Rutland in which, although not fully explained with reference to this particular point, the circumstances would appear to be similar.

If we may suppose that a clay subsoil tolerably near the surface prevents the subsidence of materials undergoing decay to a point where they would meet the constantly moving current of subsoil water, it would seem probable that a ledge of rock would have the same effect. Our correspondents at Worcester, at Rockport, and at Beverly have remarked something of this sort. At Worcester there is a ledge thinly covered with earth, on which are built excellent houses, having all pro-

*The line of division on the geological map of Massachusetts runs from Muddy Cove near the northern extremity of Great Tisbury Pond to the southern extremity of Lagoon Pond.

The *Eocene Tertiary* includes all of Chilmark, two-thirds of Tisbury, and a little corner of Edgartown. The *Drift* includes one-third of Tisbury and nearly all of Edgartown. These two portions of Martha's Vineyard are of apparently equal extent.

visions for health and comfort, but typhoid is a more frequent visitor there than in other parts of the city.

In a manuscript report of lectures on continued fever by the late Dr. James Jackson of Boston, taken in his lecture-room about forty years ago, we find these passages. After speaking of the great obscurity of the subject, he says:—

"From analogy with intermittents, we are led to suspect the cause from local miasm, occasionally confined to a particular house, continuing perhaps six months, and affecting the members of the family successively."

Dr. Jackson reports cases in proof, as follows:—

"A family moved from the country into a new double-house in Boylston Street, and were all attacked with fever. No visitors took the disease. None were sick in the other part of the same house, though both drank from the same well; and none were sick in the vicinity. No nuisance could be discovered, and yet we must suppose some local cause not offensive to the senses as in other cases, or else contagion, which last we have seen did not exist. Such family diseases often occur. Dr. Jackson had known thirteen persons sick in one family, isolated in the country. Sometimes the disease is limited to small districts; most often in Boston at the South End, and about Hartford Place and Fort Hill. Persons going to these districts take the disease, but persons removed from them do not communicate it. This must be caused *by some material in the ground itself*, not by the water or anything on the surface.

"Sometimes it pervades a whole city; it is then of a more mild character. Nor is this peculiar to thick settlements, but it occurs in limited districts in the country. An argument against contagion is that the fever breaks out in many different spots at the same time. Sometimes a very large district is infected, perhaps a hundred miles square, as was the case in the epidemic of spotted fever. In all cases the disease is confined to a limited district, and many are affected without any communication with diseased persons. So that all the cases of the disease cannot be attributed to contagion, and if most cases can be accounted for without contagion, it is probable that all may be.

"The cause of disease is *in the soil itself*, for if it was from the atmosphere, the disease would be much more extensive than if from

the soil, and even there it is very slowly developed. It rises indeed into the air, but is then so much diluted * as not to produce disease. The analogy with intermittent fever renders this probable."

In Dr. Jackson's published lectures (1825), after referring to the subject in similar terms to those just quoted, he says:—

"These facts taken together and compared with what is known respecting the causes of intermittents, create a probability that some emanation may take place from the soil capable of producing continued fever; yet, if this be admitted, it must be allowed that the material thus emanating is not known, the qualities of the soil from which it arises are not known, and the only advantage from the observation is to lead us to avoid the places in which fever prevails."

Certainly here is to a certain extent corroboration of the modern views of Pettenkofer to which reference has already been made. Pettenkofer says that when soil is "typhoid ripe" the disease appears; and that it becomes ripe through "organic processes" taking place in the earth. This expression is constantly used by him, but we have been unable to find in any of his writings on the subject any more definite explanation of the term. That he would convey the idea that these "organic processes" are the changes involved in decomposition seems evident enough.

It will be seen from the tabulated replies to the second question of our typhoid circular, and from the letters which we publish, that it is not possible as yet to know whether the same rule with regard to ground-water holds good in Massachusetts as in Munich—that is to say, whether the fall and rise of subsoil water corresponds with the increase and subsidence of typhoid epidemics. There can be no doubt whatever that the season when the level of water in the wells is as a rule very low from the absence of rain, is the season of typhoid fever throughout New England. A perfectly well-marked coincidence is here observable. Beyond this, the special ideas of Pettenkofer concerning ground-water have not been put to the proof.

* See the remarks of our correspondent in Dudley about *sleeping on the ground floor.*

A large number of correspondents assure us that in future epidemics the change of water level in the wells will be noted.

If we may imagine that the organic matter retained in soil near the surface under certain conditions of season and temperature gives rise, in the course of its return to inorganic elements, to some specific product as yet unrecognized by organic chemistry, we may see how the specific poison of typhoid fever may be generated.

The secrets of organic changes are for the most part hid from human eyes. Yet the poisonous aldehyde, produced under certain circumstances in the process of acetous fermentation is now well known. We may not despair of yet seeing the typhoid poison made equally manifest.

Physicians know that in the decomposition of the human body there is a period, soon after death, and previous to the evolution of offensive gases, when the fluids often possess poisonous properties. Dissection wounds are then far more dangerous than when decomposition has become advanced.

So we may find that when the decay of organic matter, whether in soil or anywhere else, has become evident to the sense of smell, the danger to the health of those exposed to it, in so far as that portion is concerned, may have passed its maximum. But these are mere speculations, to be overthrown or confirmed as science advances.

We have no disposition to enter at length upon so obscure a subject as the influence which may be exerted on health by dwelling upon special soils. Yet we cannot forbear to express our conviction that in this direction will be ultimately found an explanation of many things in the history of disease which are now mysterious. The property which earth possesses to render harmless the most revolting substances, a property known to the Jews from the earliest times and recently revived in plans for the disinfection of human excrement; the salutary virtues which fresh clods of earth are known to possess in removing animal poisons, as known to the Indians and to us their successors in America, and recently employed in the dressing of suppurating wounds; the influence which dwelling upon *wet* soil has been recently shown to have upon consumption; the influence (recognized in all time) which certain soils have upon intermittent and remittent fevers,—all these

observations point to *the earth* and the changes as yet unexplained which are there constantly taking place as the source of influences bearing directly upon our health and life.

The analogy between fevers generally known as miasmatic (intermittent and remittent) and the continued or typhoid fever of New England, pointed out by Dr. Jackson, becomes very significant when we look at the experience of practitioners all over the State with reference to the bottoms of ponds and reservoirs laid bare in the seasons of drought. These are the very places which would surely give rise to intermittents in our Southern country. Here they give rise to fever without remissions,—to typhoid.

Another analogy with intermittents may be seen in the greater liability to typhoid on the part of new residents, as referred to in our letters from Ashland, Fall River and Lowell.

Some of the possible influences of soil on health become more intelligible when we consider how much air it contains, and how readily this may become the means of transmitting anything which the soil may hold to those who dwell above it. A vessel of any sort filled with dry earth compressed as much as possible will still absorb one-quarter to one-third of its bulk of water without overflow. All this water represents space which has been previously occupied by air. If we look upon the soil as a kind of cover to what lies beneath it we must remember that the cover is not tight, that it is always partially open, and that whatever recondite properties the soil may hold, whether for good or evil, will be sure to come to the surface through the agency of air, which must change its position with the slightest change of temperature, such as must be occasioned by the alternations of day and night. Gases produced by decomposition must of necessity rise to the surface; moreover our houses are, in effect, bell-shaped enclosures, in which are retained with more or less completeness whatever the soil beneath us may have to render up.

On the question of the propagation of typhoid fever by contagion there is little new to be said, and what is old is contradictory. When two such authorities concerning the fever of New England as Dr. Nathan Smith and Dr. James Jackson differ in opinion on this point, we may be sure that it is one not readily settled. That typhoid is contagious in the same

degree as smallpox, measles or scarlet fever, no one perhaps would affirm; yet many believe it to be communicable at times like erysipelas and puerperal fever.

Facts and opinions relating to the contagiousness of typhoid fever may be found in our letters from Dennis and Franklin.

The single continuous thread of probability which we have been able to follow in this inquiry leads uniformly to the *decomposition of organized* (and chiefly vegetable) *substances* as the cause of typhoid fever as it occurs in Massachusetts.

Whether the vehicle be drinking-water made foul by human excrement, sink drains, or soiled clothing; or air made foul in enclosed places by drains, decaying vegetables or fish (Swampscott), or old timber (Tisbury), or in open places by pigsties, drained ponds or reservoirs, stagnant water, accumulations of filth of every sort, the one thing present in all these circumstances is *decomposition*.

And may not the influence of soil charged with vegetable remains, in the season of heat and of drought, be also referred to the same cause? Although not yet proved, it is exceedingly probable that *a rich and fertile soil in which decomposable substances are retained near the surface by any cause, whether a clay subsoil, or a ledge of rock, or a protracted drought, is a soil favorable to the production of this special disease.*

The all-important question remains to be answered, whether, if these are the causes, typhoid fever can be avoided. With the single exception of such changes as may occur in soil through natural processes, all the various causes assigned are within human control; they are indeed instances of human neglect; of the omission of what all human experience has shown to be necessary for the preservation of the highest condition of general health. And standing in the connection they do to one of our most destructive special diseases, they but enforce the truth of the general statement that clean air and clean water are among our greatest blessings.

As regards soil, and the obscure processes, doubtless connected with decomposition, which seem at certain seasons, and under circumstances as yet ill-defined, to play so important a part in the production of continued fever, we are certainly far

less able to guard against its influence. Yet we are not quite so powerless in this respect as might be inferred from a passage quoted from the lectures of the late Dr. James Jackson. It is now more evident from what kind of soil typhoid fever springs.

The comparative exemption of crowded cities and towns leads us to believe that their more solid pavement, seldom disturbed, and free from vegetation, is a real protection against the emanations of the earth. Although those who live in the country are necessarily surrounded by open ground, they can have cellars thoroughly cemented,* and, in the season of typhoid at least, they can usually avoid sleeping on the ground floor.

We cannot more fitly conclude these remarks on the probable causes of the typhoid fever of Massachusetts than by again quoting one of the most original and far-seeing men of the last century, Dr. Benjamin Rush, who says: "To every evil the Author of Nature has kindly prepared an antidote. Pestilential fevers furnish no exception to this remark. The means of preventing them are as much under the power of human reason and industry as the means of preventing the evils of lightning or common fire. I am so satisfied of the truth of this opinion that I look for the time when our courts of law shall punish cities and villages for permitting any of the sources of bilious and malignant fevers to exist within their jurisdiction."

*It is greatly to be desired that some material more impervious to gases than hydraulic cement should be used for the floor of cellars in both country and city.

LETTER

FROM THE

CHAIRMAN OF THE STATE BOARD OF HEALTH,

CONCERNING

HOUSES FOR THE PEOPLE, CONVALESCENT HOMES,

AND THE

SEWAGE QUESTION.

LETTER.

BOSTON, December 10, 1870.

To the Members of the State Board of Health of Massachusetts:—

GENTLEMEN,—During the past summer, while I was residing in London, I thought I could not serve Massachusetts better than by investigating, as thoroughly as I could in the short time at my disposal, the homes of the London poor, and some of the means now used to improve them, together with some other topics of similar importance. The results have been of very great interest to me. I have therefore embodied them in this letter to you, hoping that you may regard my labors as not wholly useless in our important public work. The subjects may be divided into several sections, each of which is a distinct statement, and may be read without regard to its companions.

First. A night-stroll with a London police inspector, compared with a similar one taken afterwards in Boston.

Second. Operations of philanthropy, solely or chiefly as shown in the Peabody Buildings and Miss Burdett Coutts's Market, Reading-Room and Home at Columbia Square.

Third. The operations of the "Improved Industrial Dwelling Company;" or, philanthropy and capital united, with success to both.

Fourth. The Jarrow Building Company, by which a tenant becomes a proprietor of the home he lives in.

Fifth. Organized work among the poor, inaugurated by Miss Octavia Hill, assisted by Mr. Ruskin and others.

Sixth. A comparison between a model lodging-house, and a low tenement-house in Boston.

Seventh. Convalescent homes.

Eighth. The "sewage question" in England.

I.

A NIGHT-STROLL WITH AN INSPECTOR OF THE LONDON METROPOLITAN POLICE, AND A SIMILAR WALK IN BOSTON.

On the evening of July 20, 1870, I started with a friend on a walk through the purlieus of Whitechapel and of Ratcliffe Highway, two of the most noted thoroughfares of vice, poverty and crime in London. Our arrangements had been previously made with the chief of the Metropolitan Police. We were directed to report ourselves at 9 P.M., at the L—— Street Station, there to meet Inspector G——. Prompt at the moment named, we appeared, and were graciously received by the chief of the station, who introduced us to our guide.

We had confidence in him from the first glance. He had a mild, but, at the same time, a fearless look, and his muscular powers were evidently such as to make him capable of coping with the roughest. After examining the station itself, its arrangements for the comfort and convenience of the policemen, and the cells for the prisoners, we started for the specific object we had in view, viz., inspection of the public lodging-houses of the poor and criminals in that part of London, and over which, in certain points, the police have an almost supreme control.

During that long walk from 9 P.M. until 2½ A.M., I met with persons and events of the deepest interest. We visited the lowest dens of private degraded poverty and crime, and strolled leisurely through whole streets in the "thieves' quarter," so called because occupied by these prominent members of "the dangerous classes." We saw women and children working at dead of night under the bright gas-light of the obscure and filthy courts in which they lived. We found an orphan girl about 14 years of age thus toiling for a mere pittance, to support three younger brothers and sisters. We followed closely in the steps often before trod by Dickens, and saw the opium-smoking hag he has so graphically described in Edwin Drood. She blew out before us, as before the great novelist, huge blasts of smoke

from her broad animal-like nostrils, as she lay in a half-dreamy state across her filthy bed. In one dark alley, so narrow that our party went in single file, and I was the last, I observed a little girl flitting around me, and while scarcely able to see them, I felt her tiny fingers fly about my pockets with a lightness, and an exquisite delicacy of touch, worthy of one of Fagin's most apt scholars. Though I knew she would be unsuccessful, because, foreseeing such an occurrence, I had carefully emptied every pocket, nevertheless, the sensation was anything but agreeable during the few moments I felt the process going on in entire silence, and almost complete darkness. Almost everywhere in these dark passages were dimly seen or heard, dusky human beings lying or sitting, sleeping or talking in undertones. At times they were sauntering about as if the night hours were their "opening day," and home was no place for them. Indeed, the private houses into which our guide led us, were wretched and filthy enough to drive away any one not wholly lost to decency and cleanliness. Our walk culminated with a bloody assault made by a noted bully upon a young girl, probably some poor outcast, who having no proper home in which she could rest, was flaunting out in one of the narrow streets of the "thieves' quarter," as late as when the morning was just breaking. We entered and examined one of the public lodging-houses, where the poor, vicious or criminal congregate at night, and which, for the past few years, have been under the strict surveillance of the police. Any man has a right to open one of these houses, but he must do so in strict conformity to law, and be constantly inspected by the police. We saw one house capable of receiving three hundred males. We stumbled up the clean, but uneven and rather circuitous staircase, and entered a large room nearly filled with single and narrow cots. Many of them were occupied with stalwart men. In the dim light of a low gas-jet their half-naked forms looked Herculean, as the men either slept unconscious of our presence, or hastily drew up the covering which the warmth of the night had induced them to throw off. Every such public house is obliged to be kept clean, and to provide at least three hundred cubic feet of air for each lodger. Usually there are passages for ventilation permanently opened in the walls. Plenty of water and numerous wash-basins are found below. Immense kitchens,

with their perpetually burning fire in the grate, afford to each lodger the means of cooking his meal. In one of these houses, occupied by known thieves, nothing easily portable is seen. Even the brass stoppers of the wash basins have disappeared,—a bit of cork, having no real value, alone remains. No knives or forks are to be found; they have been stolen, and no new ones have since been bought. In such lodging houses, whether in the "thieves' quarter" or elsewhere, 3d. per night is the price for lodging, or 18d. per week.

One or more lodging houses we visited in which both sexes are admitted. Theoretically, only married persons are admitted, and each couple has one pen so to speak, allotted them for 6d. per night. That is, a large room is divided into compartments just big enough to hold a double bed, and to allow a small space in which to move around. Each partition wall is about eight feet high, but not reaching to the ceiling, which gives in a general way some circulation of air. One cannot be sure that such places may not be used at times as assignation houses. But there is little danger of this difficulty becoming very common, for over these, too, the police have despotic control; and a house would be closed that became infamous for prostitution when intended simply as a healthful lodging house. Long after midnight our walk continued. About a quarter to one A.M., our guide rang the bell of the "Casual Ward" of the district. Similar places, under the same name, are now found almost everywhere in England, and usually in connection with the union poor-houses.

Wherever in England a houseless wanderer appears at night, there will these evidences of Dickens's generous heart and all-powerful pen be found ready to receive him. They have their origin in the fact that he, in the very locality where we were then standing, had, during one of his midnight strolls with the police, seen many persons lying one cold night on the doorsteps of the Union Workhouse,—they had been refused admission even there, "because of want of room." Dickens's feelings were enlisted, and he used most efficiently his voice and his pen, until, by law, every man, woman and child in England who needs shelter can claim at least for one night, lodging, a supper, a warm bath and breakfast next morning, and perhaps some articles of new clothing are given if those used before entrance

be ruined or contain any "contagium" that will be injurious to the public health. In payment, a certain amount of labor is performed if required.

The porter soon responded to our summons. We examined everything about the establishment. It was of that exquisite neatness and cleanliness so peculiar to England. The bath-tub was as white as the driven snow; the beds were compact and clean; the floors without a trace of dirt. In the reception room we saw the signature made by Dickens at his *last* visit to the spot, only a very few months before his death.

In conclusion, I will express my admiration for the way in which English law,* and its official, who accompanied us under that law, deal with the public lodging-house system of the poor, and with the poor and vicious themselves of London. The rooms and walls of some of the buildings used as common lodging-houses in Whitechapel, are as clean, if not so fine, as those of many a palace, or humbler English home. At present the law does not feel at liberty to be so despotic in regard to the English working-man's *private* home. If he choose to have filth *in* his own premises the law does not usually prevent it. It is his castle, and therefore sacred to private right,—a most noble maxim indeed, unless it be carried too far. I believe the time will come in England, and in Massachusetts also, and it will come with the consent of the whole people, when the community will feel that an impure moral or physical *private* abode is a nuisance and crime against humanity, as much in quality if not in degree, as the filthy, ill-ventilated public lodging-house, and as such, it will be abated, if need be, by law.

Again, this thorough police inspection of public lodging-houses of the poor is the commencement of a great sanitary reform. It is complimentary to the many private enterprises for improving the houses of the people, as now carried on by private charity, or by enlightened capitalists.

Before examining the private London enterprises to improve the homes of the poor, we must compare my experience during a walk with the police of Boston with this which I had in London. Some captious person may exclaim: Why tell us about London purlieus and England's "thieves' quarters," and

* Appendix A, for summary of English law on Common Lodging-Houses.

other abominations and her laws? Have we any such places, and do we need any such laws? To such a critic I would say: Come with us in our walk *with the police in Boston's* "highways and by-ways."

I shall be surprised if the critic, after the perusal of the following account of our walk in *our Radcliffe Highway*, does not see some reason for my details upon the abominations of London, and still more for my account of the efforts recently made by English law, and by private and public charity and capital to relieve these abominations. The very similarity between London and Boston in one respect, viz., in the wretchedness of the houses of the poor in both, and the contrast between the two cities in their relative action, tending even partially to relieve that wretchedness, will I think, suggest topics worthy of serious reflection by every man and woman in the State.

At 8½ P. M., of Dec. 1st, 1870, we* met by previous appointment at the Hanover Street police station. Our guide not having arrived we sat a half hour, and during that time, a well-dressed but drunken woman was brought in reeling, and she was forthwith transferred to the cells below. Soon afterwards a man who said he was about 50 years old—a "worker along shore," and who got his meals "here and there on the street once in a while," and who "had no home," claimed a lodging. He was kindly received, but I saw none of the paraphernalia of Dickens's Casual Ward, and no food is usually given.

The station, in every respect, is superior to that at L—— Street, London, both for the police and the prisoners. This was probably owing, in some measure, to the fact that the Boston station was built for the purpose, whereas that in London is an old building, aristocratic looking, it is true, with its sweeping and ornamented staircases, and its large rooms. But they are not adapted to the purposes intended, even in that portion occupied by the police; and in others where the prisoners were kept they were rather crowded. The Boston station, however, I do not think, in some respects at least, entirely proper for human beings, however degraded, to be compelled to stay in even for a short time. The cells are in the cellar. They seem clean. The outsides of them are scrupulously nice. The com-

* The Secretary of the Board, Dr. Derby, had previously made arrangements with the Chief of the Police. We went together during the evening.

forts for passing the night are very small. Four persons can be shut in one room. Four *bunks* are arranged in some, and these are made of strips of thin iron about an inch wide. At the head these strips are sloped, apparently to serve as a pillow. No mattress or even straw to lie upon, or covering of any kind were visible. The whole cellar at the time of our visit was heated intensely by means of steam, or hot-water pipes. "We have no blankets," said our guide, "so we have to keep the room warm." The earnest appeals for cold water from the various cells were quite striking to us strangers, and the behavior of one of the prisoners when the cell door was opened, was quite suggestive of suffering undergone. Hastily, and without waiting for the ceremony of a cup, he ran towards the pipe, and bending down with his face turned upward, and his mouth distended, gulped down a long draught of Cochituate from the open water-pipe. It was like the long draught of a thirsty animal taken from some running stream during the hot noon-day.

Soon afterwards we started on our walk and almost immediately entered Stone's yard, where about a year ago a murder was committed. Our guide lighting a bit of tallow candle which he carried with him, led us up a broken and dirty staircase, which, for its filth and dilapidated condition, was quite equal to anything I saw in London. In the chamber of murder we found a mass of extreme wretchedness. A young man was crouching beside a hot hard-coal iron-pot stove, while another, a red-eyed, sinister and dogged-looking youth, was seated apparently for want of any better place, on the foot of a nasty bed. One old woman was gleaning with her skinny fingers bits of coal from a mass of half-burned ashes and cinders, while another stealthily looked at us from a corner where she sat upon the floor. I felt quite secure with our guide, but I should have shrunk from being there alone at night. "How came you here?" asked our guide of the red-eyed individual above alluded to. "I came to visit that man," was the only and curt reply. "And who is he to whom you spoke?" I asked, after leaving the filthy spot, and getting into the open air. "He is a thief, and has no other business. He is not a bold operator. He steals little things, here and there. He loves to rob drunken men when they are asleep upon the sidewalk or door-steps, and

sometimes he makes a fine business of it. One of the prisoners you saw this evening was found drunk, and with over two hundred dollars in his pocket." The passage-way leading to this court, and the court itself, are simply infamous with their stinks. That sharp, Saxon word alone expresses the thought I wish to convey. The privies were filled to overflowing, and covered with nastiness to the extent of two or three feet from the seats, when I visited and inspected them six months ago, and from what our noses and our eyes, with the aid of our dim light could perceive, there has been no improvement in the interval.

In these passages were passing and repassing several persons, young and old, male and female, apparently peering at us intruders in their private premises, and yet how did they stand with relation to the landlord of these filthy abodes? As our guide informed us, the rent is rigidly exacted, and if not paid the scanty furniture is summarily pitched out into the filthy passage-way, and the tenant is ejected. My indignation is excited to think that the city authorities allow even one such tenement to remain to taint the atmosphere, both physically and morally, of the whole neighborhood, especially when we have laws stringent enough to abate this and many more similar nuisances that are scattered here and there in Boston. More especially am I indignant to think that some of these houses are at times owned by men living in luxury, in our most fashionable places, men moving in political power, nay men of irreproachable religious *appearances*, who talk of Christianity, and perhaps listen with becoming gravity to the beautiful teachings of the Sermon on the Mount, Sunday after Sunday.

These men will either themselves, or through some paid agent, receive of the landlords who sub-let these hells on earth, the hard-earned pittance obtained by vice or crime perpetrated by the denizens of these filthy tenements. While in London I heard from what I deemed good authority of nobles of the land fattening on the price gained by whole streets of brothels, and even some ancient ecclesiastical establishments, surfeited with the wealth which land in London gives to every large proprietor of it, have not, it was said, quite clean skirts in this particular. Similar men and similar buildings exist in Boston. Public opinion ought to condemn such persons and such buildings as I

have described in London, and shall still further describe as seen during this walk. But neither Old nor New England at present cares to do so. Every one has a right to let his own house as he pleases. If he choose to sub-let to a Carker, or even a Fagin, no one can complain. He may, week after week, shut his eyes to the real cruelties and enormities perpetrated on his own premises, provided only that the fawning agent will pay into his patron's already overflowing coffers the rent justly (?) his due. This may seem hard language; nevertheless I believe it strictly true. Public opinion should bring such landlords to strict social justice, and the public law should summarily abate the physical nuisances on their property. But let us walk on. Every other house in certain large parts of North, Cross and Richmond Streets has a dancing hall connected with it. We visited several of them. Nothing improper in the behavior of the inmates was observable. In one place blacks and whites were mingled in the mazy waltz, and the gentle whirls of the dance, as performed by a beautiful white girl of about sixteen, with her negro partner, presented nothing (save in that union) that would have been inconsistent with society as seen in any of the palatial residences in the Commonwealth or Fifth Avenues of Boston or of New York. Bars stand near each dancing room, and after the dance is over those engaged pay ten cents and "treat" their partners, I was glad to see not to intoxicating drinks, but to milder beverages. The proprietors of these places know their own interest too well to allow of liquor being sold. That would produce riot, and riot would soon close the establishments. The proprietors know the varied allurements, strange as that word may sound, of these places are enough without dram-drinking, and as I watched the dance going on, I thought that possibly it was the only ray of real pleasure that shines down upon at least some there who were engaged in it. The young love to dance, and the child trips with her feet to the sound of music as naturally and as gleefully as the lamb skips under sunny skies over the greensward. The act of itself is harmless, though Puritan religion formerly condemned it as always fraught with evil. It may be sanctified to virtue and to the highest amenities of human life when used legitimately within the precincts of home. Those living in these places, however, have no proper home. Many of the lodging

places are simply horrible. To know this, stoop with us, and crawl cat-like down this dark cellar-way, and see a *home* in Boston! This cellar room is scarcely high enough for us to stand erect. One can easily almost touch each of the four sides while standing in the centre of it. The floor is dark, dirty and broken; apparently wet also, possibly from the tide oozing up. Two women are there, commonly, yet rather tawdrily dressed, and doing nothing but apparently waiting, spider-like, for some unlucky, erring insect to be caught in their dusty but strong meshes. Tubs, tables, bed-clothes and china ware, are huddled incongruously together. Our guide strikes a match by the stove, and then opens a door into a so-called bed-room. It is a *box*, just large enough to hold a double bed. No window is in it, no means of ventilation, save through the common room up the cellar steps. The bed is of straw, covered only by a dirty blanket. Everywhere is the picture of loathsome filth. The stench, too, of the premises is horrible, owing to long accumulated dirt, and from the belching up of effluvia from solutions of dark mud, reeking with sewage water from the city drains and water-closets. It is difficult for us to breathe in the tainted atmosphere. We feel ourselves enveloped in a physical atmosphere most horrible, and a moral one most degraded. We glance into another "bed-room!" opening by another door into this common room. It is a fac-simile of its neighbor. Upon the dirty blanket lie recently washed and finely starched wrist-cuffs, and the jaunty modern hat and feather now worn by all. The strange contrast between fashionable neatness and exterior properties of appearance with supreme nastiness was never more strongly manifested. "How much do you pay for these rooms?" we asked as we turned to leave. "Four dollars a week!"

"Take care of your heads" said our guide, as we again, in single file, crept up the cellar stairs, and tried to breathe again freely in the open street, after stooping low to avoid the blow we should inevitably have received if we had walked erect. "Yet," quietly remarked our guide, "in just such places, strangers, men of respectability from the country, go and lose their money and their watches, and then come stealthily to us begging us to regain their property without bringing shame on themselves." What a revelation! I saw no worse home in

Whitechapel. I even doubt whether any so bad can exist under English law. And this was not a solitary example. We visited several of the same type. If any faith can be put in the idea of an overruling, retribution-paying Justice; if any confidence can be placed in all the deductions of modern sanitary science, Boston will sometime suffer the heaviest of penalties for its great guilt in these matters. Nay, is it not even now suffering the direst of calamities in the deleterious influences exerted on every child born within such dens? In one place, while our guide, with the usual nonchalence that long possession of known and acknowledged authority always gives, was lighting his candle, a woman earnestly called out, "Please take care and don't wake the baby." "Oh, no," replied our guide in kindly tones, "the baby shall be taken care of.". Following his light, we with difficulty ascended a very narrow and broken staircase leading from the cellar to a chamber, if it might be so called, above. It was of an irregular shape from three to five feet broad, twelve to fifteen long, and contained three beds. One of them was a small one and on it lay a beautiful babe about six months old. Its little arm was lying outside the dark and soiled bed-clothes; its dimpled fingers were as delicate and beautiful as a child's alone can be. It was calmly sleeping in that den of all uncleanness, unconscious of its future fate. And how hard must inevitably be its fate, it was plain enough to foresee. Born amid the haunts of vice and crime, bred in filth, how could it ever know, at least in its tenderest years, the sweet delights of a clean and happy home? What more natural than the thought which arose uppermost in my mind while looking down upon the little sleeper, "Would that you had never been born. Here you are, beautiful of form, and with all the capacities perchance of an archangel for intellectual development and for moral worth. Yet what chance have you, in this fierce struggle of life, of gaining either?" One might as well hope to train up a California pine in the darkness of a cellar, while bruising each hour some tender shoot as it is struggling towards the light and air of heaven, as to raise a child to perfect physical health, real learning and virtue in such a spot. And yet such spots are numerous in Boston. Proud is our city and justly so of her churches, her religious freedom and her public schools. But of what use are

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II.

OPERATIONS OF PHILANTHROPISTS FOR THE IMPROVEMENT OF THE DWELLINGS OF THE POOR IN LONDON.

Under this head I shall allude to the Peabody Buildings, and to those erected by Miss Burdett Coutts.

I fully concur in the following words emanating from three eminent men of Great Britain, viz.: Dr. W. T. Gairdner of Glasgow, Mr. Rawlinson and Mr. Druit of London.

Dr. Gairdner says: "On whatever other points sanitarians may differ, there is a remarkable concurrence of opinion as to the primary need of improved house accommodation for the lower classes." (Remarks on the Sanitary Condition of Glasgow.—*London Lancet*, Oct. 15, 1870.)

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Whitechapel. I even doubt whether any so bad can exist under English law. And this was not a solitary example. We visited several of the same type. If any faith can be put in the idea of an overruling, retribution-paying Justice; if any confidence can be placed in all the deductions of modern sanitary science, Boston will sometime suffer the heaviest of penalties for its great guilt in these matters. Nay, is it not even now suffering the direst of calamities in the deleterious influences exerted on every child born within such dens? In one place, while our guide, with the usual nonchalence that long possession of known and acknowledged authority always gives, was lighting his candle, a woman earnestly called out, "Please take care and don't wake the baby." "Oh, no," replied our guide in kindly tones, "the baby shall be taken care of.". Following his light, we with difficulty ascended a very narrow and broken staircase leading from the cellar to a chamber, if it might be so called, above. It was of an irregular shape from three to five feet broad, twelve to fifteen long, and contained three beds. One of them was a small one and on it lay a beautiful babe about six months old. Its little arm was lying outside the dark and soiled bed-clothes; its dimpled fingers were as delicate and beautiful as a child's alone can be. It was calmly sleeping in that den of all uncleanness, unconscious of its future fate. And how hard must inevitably be its fate, it was plain enough to foresee. Born amid the haunts of vice and crime, bred in filth, how could it ever know, at least in its tenderest years, the sweet delights of a clean and happy home? What more natural than the thought which arose uppermost in my mind while looking down upon the little sleeper, "Would that you had never been born. Here you are, beautiful of form, and with all the capacities perchance of an archangel for intellectual development and for moral worth. Yet what chance have you, in this fierce struggle of life, of gaining either?" One might as well hope to train up a California pine in the darkness of a cellar, while bruising each hour some tender shoot as it is struggling towards the light and air of heaven, as to raise a child to perfect physical health, real learning and virtue in such a spot. And yet such spots are numerous in Boston. Proud is our city and justly so of her churches, her religious freedom and her public schools. But of what use are

her churches, her freedom and her schools to those of her children, whom she allows to grow up in such places as these I have attempted to describe. All these advantages are a mockery even and a snare; for while we piously exclaim, "See how good and learned we can make our citizens," at the same moment, we are allowing such evil influences to exist broadcast amongst us. I am not such an optimist as to believe that we can root out all vice by building houses, but I do contend that if for no other purpose, for the physical good of the persons themselves, and for the safety of the public health, nuisances like this vile abode I have attempted to describe should be summarily dealt with by the law, and that better houses should be everywhere erected for the people, even the most vicious and degraded. Where are our lines of Peabody, Burdett Coutts or Waterlow buildings; our "Casual Ward" or our cheap public lodging houses, with plenty of air and fresh water given to every one by the law of the land? Where are our "organized workers among the poor"? For sanitary if not for moral reasons would I urge these questions warmly home upon our citizens individually, and upon the public authorities.

II.

OPERATIONS OF PHILANTHROPISTS FOR THE IMPROVEMENT OF THE DWELLINGS OF THE POOR IN LONDON.

Under this head I shall allude to the Peabody Buildings, and to those erected by Miss Burdett Coutts.

I fully concur in the following words emanating from three eminent men of Great Britain, viz.: Dr. W. T. Gairdner of Glasgow, Mr. Rawlinson and Mr. Druit of London.

Dr. Gairdner says: "On whatever other points sanitarians may differ, there is a remarkable concurrence of opinion as to the primary need of improved house accommodation for the lower classes." (Remarks on the Sanitary Condition of Glasgow.—*London Lancet*, Oct. 15, 1870.)

Mr. Rawlinson, in his address before the recent Social Science meeting at Newcastle, stated in rather strong, but I think true words, that "defective house accommodations produce disease, immorality, pauperism and crime, from generation to generation, until vice has become a second nature, and morality, virtue, truth and honesty are to human beings so debased, mere names."

Mr. Druit (address at the meeting of the Association of Medical Officers of Health, as reported in *Medical Times* and *Gazette*, Oct. 22, 1870): "For myself, I do not hesitate to avow my belief that, for the dwellings of the laboring classes in cities, provision must be made by public authority."

A philanthropy, which raises a man's self-respect and not a mere charity (which usually lowers it) lies at the basis of the operations seen in the Peabody and Burdett Coutts Buildings.

The Peabody Buildings.

The world knows the fact of their establishment in London by the late Mr. George Peabody, who gave £500,000 as a fund for that purpose. In his letter to the trustees, he writes that he wishes "the fund or a portion of it to be used in the construction of such improved dwellings for the poor, as may combine in the utmost possible degree the essentials of healthfulness, comfort, social enjoyment and economy."

I have visited and examined carefully all the buildings at present erected, I have conversed with the superintendents of each, and will here give a general summary of the results of these inquiries.

There are five series of houses, viz.: at Chelsea, Spitalfields, Islington, Shadwell and Westminster.

The following table shows the number of buildings and number of families that can be received, and the general rates of prices per week:—

Places at which the Buildings are Erected.	No. of Buildings at each.	No. of Families each can receive.	Prices.			
			One Room.	Two Rooms.	Three Rooms.	Two small Rooms.
Chelsea, . .	4	136	2*s.* 6*d.*	4*s.* 0*d.*	5*s.* 0*d.*	– –
Islington, . .	4	165	2 6	4 0	5 0	– –
Spitalfields, . .	*	58	2 6	4 0	5 0	– –
Shadwell, . .	4	200	2 6†	4 0‡	5 0§	3*s.* 6*d.*
Westminster, .	3	175	– –	– –	– –	– –
Total, . .	. .	734	– –	– –	– –	– –

* Spitalfields buildings are built on an irregularly shaped lot of land, in a great thoroughfare, and therefore cannot be compared with the others.

† Reduced lately in consequence of trade falling off, to 2*s.* 3*d.*

‡ Reduced lately in consequence of trade falling off, to 3*s.* 3*d.*

§ Reduced lately in consequence of trade falling off, to 4*s.* 3*d.*

No tenant can enter the buildings if he receives more than thirty shillings weekly. It would thus appear that these buildings are intended for the poorest. They are scattered in various districts of the metropolis. Some are more in demand than others. Westminster, for example, is constantly full, with applicants in advance. Shadwell, on the contrary, though of most palatial grandeur and with fine appointments, has recently lost several of its tenants, because trade (in ship building), which was very brisk a few years ago, has now wholly left the Thames, in consequence of the persistent strikes in which the workmen on the Thames have indulged. The trustees have, therefore, felt obliged to reduce the rents of all these rooms, and one-quarter of them, at the time of my visit, were unoccupied.

With the exception of Spitalfields, which being on an irregular and rather confined thoroughfare, is of an irregular shape, the groups of buildings are all erected in a rectangular form, with broad intervening spaces, allowing free access of light, sun and air, and at the same time, in the centre is a playground for the children. The surroundings and the passages are all very neat, and generally paved, either with flat flag or flint stones, and in one instance simply covered with gravel.

In these, parties of laughing children are almost always playing. None from the outside are allowed to enter. To one standing in these squares, the buildings present not only a very neat appearance, but some of them (Westminster and Shadwell) have an air of real grandeur. Moreover, the enthusiasm of almost all the occupants of the rooms for the cultivation of flowers, which of late years seems to have become a real passion with the English people, increases the beauty of the building, as some most brilliant displays of blooming plants are made from many windows. If the scene at times becomes very striking and picturesque even to the eye of the casual visitor, so it must have a benign and refining influence upon all the inhabitants of the place.*

A small black or bright brass knocker is upon each family's door, and it was touched by the superintendent with as much deference, when calling upon the occupants, as if he were tapping upon a street door in Belgravia or of Beacon Street. The Peabody Trustees evidently mean that every man shall consider himself as really at home, when he enters their buildings, as if he occupied a palace at Hyde Park. The deportment of all the superintendents in this wise impressed me very favorably.

The rooms were clean, and the various arrangements for cooking were admirable. The houses have long corridors running directly through the centre and along the entire length of each story. These corridors communicate with a central staircase of stone steps. The ceilings are not very high, and the corridors are ventilated and lighted by a window at each end and partially by the central staircase opening. There are two water-closets at each extremity of each corridor. All the front doors open on these same passages. Hence I should fear two results may, at times, happen deleterious to health. Unless great care be constantly taken, the passages may gradually become soiled. Filth may accumulate and noxious vapors arise from the water-closets, provided they are not strictly and daily washed, or oftener. In case of an epidemic it would be impossible to isolate completely any apartment, as the front door of each opens into this general pathway. The reply to these objections is that the care taken hitherto has prevented

* Societies are formed in many parishes to promote this object, and prizes are given for the best specimens of the most common flowers.

malaria from the water-closets, and no epidemics have as yet ever appeared in either of the houses, although at times diseases have prevailed extensively in the immediate neighborhoods. The attics are used, in common, as large washing, drying and bathing rooms. This community of goods in other places usually does not succeed well. Finally, I cannot think that the universal custom of leaving the brick walls and partitions uncovered, save by a white or colored wash, is agreeable to the eye, or can be so *homelike* as others covered with neat paper, &c.

In making these brief criticisms I trust that no one will deem that I undervalue the magnificent plan of the benefactor, or would throw the slightest shade upon the labors of the trustees. They are both beyond praise. But if any one in Massachusetts thinks of imitating this great act of benevolence, and seeks for light from these buildings, let him consider these points and compare them with the views of Sir Sydney Waterlow and Mr. Allen, which I shall give later in this letter.

I conversed long and freely with each superintendent of the Peabody Buildings. The resumé of the whole may be made as follows: Sickness is very rare. Epidemics have not raged inside, though, at times, prevalent immediately outside of the buildings. The general care of personal appearance of each tenant improves. This is remarkable, chiefly in the women and children. In some instances (as the superintendent at Shadwell remarked), the change in men is "wonderful; miraculous." A drunkard, slovenly and dirty; a husband, neglectful of wife and home, under the influence of the silent example of his neighbors in these buildings, and from his own growing self-respect, became careful of his person, and his evil habits of drunkenness left him. He was literally a man *renewed*. Many, from being quarrelsome when drunk, have, without giving up wholly their bad habits of drinking, learned to sufficiently restrain themselves as to become less offensive to family and neighbors. Knowing that, according to the strict rule laid down by the noble donor, no one will be allowed openly to be vicious, he hides the fault, and that is a great deal, at least for others even if it be less than one could wish for himself. The influence on children is almost constant. They may enter the buildings uncleanly and with torn garments. But they rarely

remain long so. Maternal pride and the stimulus applied to it by the desire of the child to appear as well and as neat as its playmates, work wonderful cures. There are some however who are incorrigibly wrong-doers and filthy, and some whose nature seems to need an occasional broil. An extremely dirty tenant, or "a weekly fight," said one of the superintendents, "I cannot allow, and I have had to discharge some, though very rarely, for their filth or their brutality." Discharges for nonpayment become less and less frequent. The sense of independence on the part of the occupants is often most ludicrously shown. Some refuse even favors, such as the purchase of coal at wholesale prices through the intervention of the superintendent, preferring to buy according to their "own sweet wills," even if they pay higher!

One superintendent informed me that very absurd stories were propagated about the rules and regulations of the buildings when first opened. It was currently asserted that every one must give up a little of his manliness if he entered as a tenant. Hence, perhaps, has arisen such insane protests as that above described, instead of a *real* manliness of character.

The result of my whole examination has been that of great admiration. The influence of these buildings for good upon the health, physical and moral, of the people residing therein, is immense. They are like oases in the desert of miserable, dark and dirty abodes such as I saw among the separate residences of Whitechapel and of Radcliffe Row. They are immeasurably superior in every respect to the public lodging-houses so cared for by the police, and of which I have already given some account in my "Night Stroll with an Inspector of the Metropolitan Police." Wherever hereafter an inquirer may ask about ameliorating the dwellings of the poor, there will the name of George Peabody be mentioned with respect and love; for be it remembered that institutions managed as the Peabody Buildings, are almost purely philanthropic. The percentage for rents on the original outlays is so small that no capitalist would desire to employ his surplus funds without greater gain. We must look in other directions for plans and successful experiments in which philanthropy and capital join hands.*

Before closing wholly these remarks I cannot forbear repea

† See III. Reports of Improved Industrial Dwelling Company.

ing a remark made by one of the most eminent of London capitalists, one who perhaps more than all others has labored in this cause of raising the homes of the people. The remark was made to me when speaking of the Peabody Buildings: "Excellent as they are, how much more good would have been done, and how many more families would have been placed in healthful homes if, instead of building these large and expensive tenements, the fund had, in part at least, been spent in the purchase of suitable sites which might have been let at such *low ground-rent* as to induce capitalists to build houses according to certain specifications to be laid down by the trustees." The more I reflect on the subject the more reasonable seems this suggestion from the London capitalist.

Miss Burdett Coutts's Market House, Lodging House, and Reading Room at Columbia Square.

I know of no place which displays more the union of fine taste, with philanthropic zeal and Christian feeling, than these grand works erected by Miss Burdett Coutts for the people resident near Columbia Square. Columbia Square seems exactly the spot for such a series of institutions. In my walk to it I passed through streets filled with houses of an inferior kind, and out of which flocked troops of lively children, who evidently were born in the most humble life. Many of these legions of children seemed to be checked by their hard fate in some of the sweetest attributes of childhood. They were often thin and rarely clean, and although on many of the countenances was the peculiar bloom of young English life, the average of physical health was far less than would have appeared in any similar number of children growing up under happier auspices. Hence it seemed that Miss Coutts had wisely selected the spot for her philanthropic object.

The market-house covers a large open square, and is entered by various gothic arches of medium height. Small shops, and an inn (over the front of which appears an inscription to the memory of Sir Francis Burdett), occupy the basements of the quadrangle. In the open space of the quadrangle, at certain parts of the day, congregate the buyers and sellers. Over the various arches, and cut in the stone, appear mottoes, some of them taken from the Bible, and all appropriate for the place, and to be

plainly read by all; for example, "The earth is the Lord's and fulness thereof, the world and they that dwell therein;" "Speak every man truth with his neighbor;" "Study to be quiet and do your own business;" "A false balance is an abomination unto the Lord, but a just weight is his delight." The "practical" man may doubt about the value of these mottoes; the sceptic may sneer; the positivist complain of them as savoring of what he calls a bygone superstition—and finally the capitalist, as he wants to make money, would exclude the whole of them, and with them perhaps all the other graces that abound in the building, on the ground that they do not "pay." Nevertheless, I honor the filial piety, the æsthetic taste and the generous philanthropy that led Miss Coutts thus to shower, as it were, beauty and holy thoughts over the common ways and actions of the people and of their children. When that gentle lady is no more, thousands of hearts will bless her for the sweet impressions daily given them in their childhood and youth by the market walls of Columbia Square.

Adjacent to the square is a large hall, two stories in height, but really only one hall with four galleries, two on each side. Round tables are in each, and the newspapers of the day are there. One halfpenny is charged for entrance into this almost palace-like hall, with its polished granite columns, and, in summer, with its baskets of blooming flowers, its brilliant gas, and its numerous conveniences for reading, writing, playing chess, chequers, cards, eating, and even, in one portion, for smoking. I went into it and found most of the news I should have read at a club house. A number of persons were in each compartment. I regret to say that such a place evidently could not "pay." Nevertheless, it attracts by its cheapness and quiet, and prevents some, perhaps, from resorting to the dram shop, where heretofore alone, the poor have been obliged to go for relaxation from daily toil. Therefore I hail it as one of the prophecies for the future health, moral and physical, of the people.

Directly behind the market and reading room, stands the lodge or home for the people.

It consists of a rectangular block of four handsome brick buildings, finished with stone. A very graceful clock-tower rises in the middle, which is surrounded by a small flower garden, the whole producing a very picturesque appearance.

The houses are built much on the plan of the Peabody Buildings, and should receive the same commendation and the same criticisms. I observed that the blue-tinted bricks of the walls look more pleasantly in the rooms than the plain white or lighter colors. The superintendent reports the same results as in the Peabody Buildings about freedom from epidemics and the improvement in the deportment of the inmates. He has known cases of intoxication radically cured after residence there. There is an evening school connected with it, and lectures are frequently delivered in the hall adjacent to the market. His rules for cleanliness are to brush out daily, wash up weekly, coloring of walls every three or four years. The prices range as follows:—

For one room, ...	2s. per week.
two rooms, . . .	2s. 6d. or 3s. 6d.
three "	3s. 6d. or 4s. or 4s. 6d.
four "	4s. 3d. or 4s. 6d.
five "	5s. 6d.

He receives any one who applies, but first examines his actual residence and gets references. It differs in general principles from the Peabody Building chiefly only in receiving those as tenants who may earn more than 30s. per week, above which the latter does not go for tenants.

III.

"THE IMPROVED INDUSTRIAL DWELLING COMPANY," OR THE UNION OF PHILANTHROPY WITH CAPITAL, AND WITH PERFECTLY SUCCESSFUL RESULT TO BOTH PARTIES.

A thorough insight into the operations of this company is all-important for all who desire to know how to erect good homes for the people. In Boston, the experiment has been successfully tried on a small scale. Two or three model lodging houses

have been built, and have done good to a few families, and at the same time they have returned six per cent. interest on capital over and above all incidental expenses. But nothing has ever been carried out on so grand a scale as by the above named company in London.

Whilst the Peabody and the Columbia Square Buildings do not pretend to pay more than the smallest return to capital, the buildings of the Industrial Company give such ample returns that the directors have refused (because so fully occupied with erecting new buildings) to receive more money for the present year. While the former cannot give an entire home and separate water-closets, washing-room, &c., to each family, the latter have contrived to do so, though at a somewhat higher rent. Nay, it is one of the cardinal ideas of the prominent workers of this company, not only to provide such a home, but to so arrange it that the parents shall always have a chamber, and that the sexes shall be entirely apart among children. Moreover, the buildings are so planned that every room or bedchamber may be exposed to the open air, and shall not open into long corridors flanked by water closets at either extremity, as in the Peabody and Coutts Buildings. All of these arrangements of the "Waterlow" Buildings are infinitely superior, in a sanitary point of view, to arrangements for the same purpose found in the other two. Previous to the rising of this company, some unsuccessful experiments had been made to unite these two apparently hostile elements, capital and philanthropy.

During my night walk with the police inspector, and in one of the most filthy streets I passed through, I saw a dirty-looking, two-storied brick building, planned differently from all adjacent to it, and somewhat in the form of the model lodging houses of the present day. The windows and steps were unswept, some of the glasses were broken, and it bore all the marks of being inhabited by a rude, careless set. No flowers bloomed from its window sills; the steps leading to it were rickety, and the fence near it had that zigzag appearance so significant of a drunkard's home. There was an entire want of thrift about the whole premises. "There," said my guide, "is a model lodging house, built from a most benevolent desire to raise the miserable, and at the same time to get some return for capital,—you see how it looks now,—the poor man who built it failed in his

undertaking." To my inquiries, our guide gave the following further history: "It was originally built rather extravagantly by one full of benevolence, but of little practical experience. It stood in the very midst of an abandoned community. Hence, no one that was respectable would occupy it. The owner had not the ability or wish to collect his own rents;* consequently, great arrearages were allowed to accumulate. Finally, in despair, he leased it to another, with the idea of his sub-letting the tenements. The lessee was a man of no principle, and soon, to his horror, our philanthropist found that what he had erected for the improvement of the neighborhood was its curse,—it became the most elegant brothel of the street. Of course all this was stopped, but it was too late, the house never recovered from this blow to its reputation." Truly here was a monument suggestive of reflections of no very pleasant nature. These reflections, however, were amply replied to by the results accruing from the Industrial Dwelling Company's operations, and still more agreeably and forcibly met by the "Organized Work among the Poor," originated and so successfully carried on by Miss Octavia Hill of London.†

Again, previously to the rising of the Industrial Dwelling Company, another company had been formed. This was called the Metropolitan. It arose from the idea first brought out by that most excellent, as well as exalted person, the late Prince Consort, who proposed it at the First World's International Exhibition, viz., in his "Model Lodging House." The company arose very soon after this exhibition, and under that stimulus; but it failed to bring more than 1½ to 2 per cent. It gradually drooped and settled up its affairs as a comparative, if not a real, failure. Although its operations were more successful than its predecessor's, it failed of getting what moneyed men deemed a good return for their capital employed. Of course capital shrunk from philanthropy, and philanthropy without these "sinews" became weak.

At length the two leading spirits of the Improved Industrial Company that has accomplished this complete union, met;—employer and employed, each a genius in his own department.

* Possibly, if this gentleman had had the tact and wisdom evinced by Miss Hill, he would have succeeded in his kind undertaking. See section entitled "Organized Work among the Poor."

† See Statement V.

The able financier, the wealthy humane man, one of broad, generous views, and of a good common sense, the head of a large printing establishment, alderman of the city of London, Sir Sydney Waterlow, agreed to advance money to the practical mason, Mr. Allen. This mason labored with his hands, but his heart was full of good will to the poor, among whom he was born and had lived nearly half a century. He saw them daily everywhere around him suffering for want of "good, *healthy* and *tasteful* homes." His head became full of plans for the erection of buildings for that desirable object. He knew all the dire wants of the case, for he had grown up under the same pressure. Hitherto the home of the workingman has been neglected; "consequently," remarked Mr. Allen, "he has resorted to the tap-room, where alone he has found brightness and mirth." Fortunately, Mr. Allen was brought into relations with the rich capitalist above alluded to, who had employed him as a mason, and with him he urged his plea. Sir Sydney Waterlow listened with attention and interest, and with three other friends agreed to advance the means upon the plan suggested by Mr. Allen, provided, on its examination by an accomplished architect, it should be found to be according to strict legal and architectural principles, so as to give safety to every room and individual in it. The result was favorable, and from that time to this, viz., from 1863, Sir Sydney with others, forming a limited company, have continued to build and to extend their operations, Mr. Allen remaining as their architect and chief superintendent.

This company was originated in the above named year, and made its first half yearly report in 1864. Sir Sydney has been its chairman and mainspring since its origin, and to the vigor, fine spirit and practical sense of these two men, with ample means at their disposal, it doubtless owes its perfect success. The following extracts from the remarks of Mr. Goshen, Member of Parliament, at the 7th half yearly meeting held at the Mansion House, February 14, 1867, may be quoted. He said that he felt "that the Company was not only one of great private interest, but also of great public importance;" and that "the greater the extent to which the principle could be carried, the better we should be able to solve the great problem as to how our laboring classes are to be accommodated." "It ha

een asserted that when a low class of houses are pulled down, nd new buildings replete with all the improved sanitary arangements are erected in their stead, it can only be done at a oss. I consider that it is the object of this company to disrove that assertion, and to show that good buildings can be rected in the place of bad ones at a profit instead of at a loss." A profitable business can be done if sites are judiciously seected." Some of the speakers alluded, as capitalists, to their gratification at the fact of the good return for the money inested. One regretted that the houses were not for the very oor laborer, but rather for the common mechanic. To which eply was made that, if the artisan leaves his present home the aborer will move into it, and thus both be improved in condition.

The directors in their report say, " during the previous four alf years dividends of five per cent. had been paid, and a sum qual to 25 per cent. of the net profit was carried to a reserve nd." The directors believe that, from their previous experice, there was a fair prospect of an annual profit of at least x per cent., after making liberal allowance for contingent exnses.

The following appears in the Fourteenth Half-Yearly Report ade at a meeting held at the Mansion House, June 12, 1870.

The whole of the share capital, viz., £125,000, has been subribed, and a further sum will be borrowed at 4 per cent. from e Public Work Loan Commissioners, which will represent a tal capital of £250,000. The company had generally houses ell occupied, except at Greenwich where, owing to the deession of trade in that locality, they suffered as the Peabody uildings at Shadwell had, viz., from a loss of tenants.

The estates of the company, with number of tenements in ch, are as follows:—

Buildings.	Four Rooms, Kitchen, &c.	Three Rooms, Kitchen, &c.	Two Rooms, Kitchen, &c.	One Room, Kitchen, &c.	No. of Families.
Derby, .	–	7s. 6d.; at top, 5s. 9d.	7s. 3d.; at top, 5s. 5d.	–	168
Cobden, .	–	7s.; 4th story, 6s. 6d.	5s. 6d.; 4th story, 5s.	–	-
Stanley, .	–	7s.; at top, 5s. 6d.	6s. 6d., at top, 5s.*	–	101
Allen, .	9s.	– –	5s. 6d.; 6s. 6d.	4s.	70

* With two bed closets.

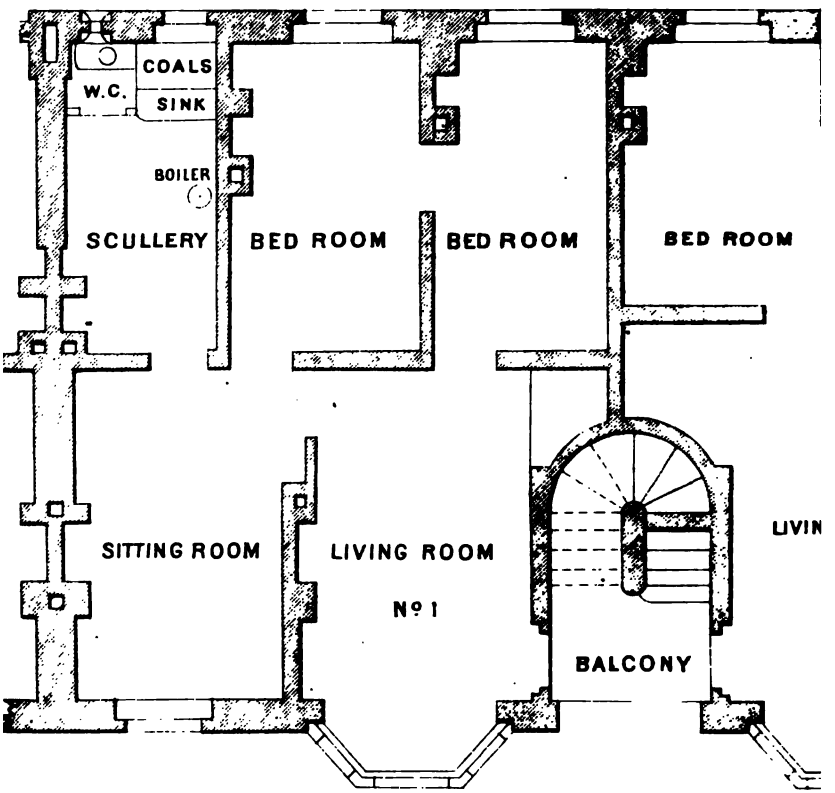
In the building now erecting at Bethnal Green, one room only is provided. We cannot but hope that this also will prove a success, even at a lower rate. Nevertheless, considering the very perfect houses, thus provided with two, three or more rooms and all their addenda, and this within very short distances from the workman's place of labor, we cannot call the rents high.

Of course it was important to see and converse with the men most interested in this great, this growing and most successful company, whether we consider it in the light of the investment of capital or as a matter of sanitary reform, destined to exert immense influence on the future health of the English people. These interviews I sought. They only convinced me more than ever of the philanthropic views and the wisdom and far-reaching sagacity of Sir Sydney Waterlow and of his able assistant, Mr. Allen. "I build for the future," said the latter to me on one occasion. "I have lived and toiled among the working men of London over forty years, and I know their necessities and their desires. They have been all that while steadily but slowly improving. I feel sure that sometime after I am dead, every mechanic will live in such buildings as we are now erecting. Each one will have his own neat, tasteful home." Mr. Allen believes in cultivating the æsthetic part of the nature of man. A well-trained flower on the window sill reveals to him humanity somewhat more developed and a better tenant to be chosen for his newly-built houses, than when he finds neglect in this particular. Yet this man is a workman



IMPROVED HOM

This sketch represents on a



						s.	d.
No. 1	*Contains*	*four*	*rooms &c.*		*Weekly rent*	*9*	*0*
„ *2*	„	*two*	„	„	*do.*	*6*	*0*
„ *3*	„	*three*	„	„	*do.*	*7*	*3*
„ *4*	„	*three*	„	„	*do.*	*6*	*3*
„ *5*	„	*two*	„	„	*do.*	*5*	*6*
„ *6*	„	*four*	„	„	*do.*	*9*	*0*

and uses his trowel if need be and dresses as a workman should when at his daily labor. Sir Sydney is the complement of him, a philanthropic financier, with ample means and full of enthusiasm for the ideas underlying their great mutual undertaking. Sir Sydney considers the company as equally a fine success as a sanitary measure and as an investment for capital. Everything is conducted on the most rigid economy; no salaries are given. Mr. Allen, who has already amassed a sufficient sum to enable him to build a block of buildings on his own account, assures me that the company never makes less than twelve per cent. He expects to make that with his own at the prices above named, and all the rooms are engaged before the house is finished.

On the plan herewith given, are seen the arrangements of six tenements or one-half of one story of "Allen's Building" near Finsbury Square. It is the latest tenement erected by Mr. Allen, and was opened in September, 1870. The building is of brick, with stone finishing. It is five stories high. The rooms are eight and a half feet high from floor to ceiling. The front is about one hundred feet on the street. Its depth is a little over forty feet. The central part of the front line is set back a short distance, and has four bay windows on each story. The two end portions present, therefore, the appearance of wings added on each side of a more elaborately constructed centre. The structure has a certain degree of elegance and refinement about its exterior, which would make it not inappropriate for any of the fashionable streets of the metropolis. Yet it is filled wholly with a series of small tenements, very convenient and perfectly lighted and ventilated, the homes of some of the humblest of the people of London. These homes are constantly occupied. The site of the building is directly opposite a wretched, low tenement house analogous to the "Crystal Palace" in Lincoln Street, Boston. Mr. Allen feels sure, from his previous experience of the influence of the Waterlow Buildings, that the silent example of his house will tend to elevate the character of its opposite neighbor.

Sir Sydney and Mr. Allen were both very earnest about their system of ventilation, which gives free access of the air to every room, and allows, when two or three doors are opened, a free circulation of air through the whole house. They both

ings are two stories high, have two and sometimes three rooms, with washhouse, &c., to each. They form long streets, which are broad and well paved, and have neat sidewalks on both sides.

On taking possession of any premises with the intention of eventually purchasing it, the tenant signs the following agreement with the trustees of the company, viz.: to pay annually ten per cent. of the price named; viz.: five per cent. for the rent and five per cent. towards the price of the estate; such payments to be made in fortnightly instalments; that if he fail to make such fortnightly instalment he shall be fined 3*d*., if a second time 6*d*., a third time 9*d*., and so on; that if at any time such fines amount to the sum already paid by the tenant, the trustees are to have the right to enter and hold the premises, as if nothing had been paid, and to eject the tenant; that possession shall be given after signing of the agreement, but that a full deed shall not be demanded until three months after the final payment, when the trustees agree to give such deed, the tenant paying the necessary expenses; that the tenant must keep the premises in good order and shall not sell them without permission from the trustees.

The above summary gives an idea of the nature of the transactions between the trustees and tenants at Jarrow. I examined the houses and found them neat and simple homes, and learned that the affair had been quite successful, and that, one after the other, each workman was becoming a proprietor of his own place of residence. The stimulus thus given to every individual mind among the workmen has been very beneficial. It had also proved an excellent sanitary measure.

V.

ORGANIZED WORK AMONG THE POOR.

In all that precedes we have found it needful to have either vast police authority, great private benevolence, or finally a combination of philanthropic effort with capital, in order to raise to a proper healthful standing the homes of the poor and of the laboring population.

We now come to consider perhaps the most interesting, as certainly it is the most extraordinary experiment of all yet instituted, viz.: what Miss Octavia Hill, the originator of it calls "organized work among the poor." It shows what a single individual can do if one only will act with patience, perfect self-control and wisdom and, if need be, self-sacrifice in a good cause. By these qualities, and with very little money, Miss Hill has succeeded in conquering difficulties seemingly, at first sight, insuperable. She has herself explained her methods in the "Fortnightly Review" for Nov., 1866, and in "McMillan's Magazine" for July, 1869, and more recently in a private way, at the request of Mr. Wilkinson, she drew up a statment which she has kindly had copied for my use, and the greater part of which I will here present. It tersely tells the story of what *has been* done. Later in this paper I will describe her usual method in more detail:—

Miss Hill's Statement, July, 1870.*

"The main principle on which the following experiment was founded, is that personal influence is the lever by which the poor can be raised; that this is exercised better by those who stand in some recognized relation to them, such as that of landlord.

* A short time before I left London in November, Miss H. informed me that she had given the paper for publication elsewhere.

"The first property, three houses of six rooms each, was bought in 1864 for £828. It was leasehold with an unexpired term of fifty-six years. It has paid five per cent. from the day of purchase on the capital invested. It has repaid a portion of the capital: a further sum of £40 has accumulated from the profits, which sum, Mr. Ruskin, the proprietor, wishes to devote to benevolent purposes. It has also paid for building a room for social gatherings. These sums have been realized after providing for the repair and continuous improvements of the property. The second purchase was a freehold consisting of land, on which stood five houses of four rooms each, and one of fourteen rooms, and some old cowsheds. It was bought in 1866, and cost £2,725. The cowsheds were demolished, and the space used as a playground for the neighborhood. An additional floor has been added to the houses, making forty-five rooms in all. This property has realized five per cent. also, and considerable sums for repairs and improvements.

"Encouraged by the result of the experiment, Mrs. Stopford Brooke last autumn bought the leasehold of five houses in Barnett's Court. Each house contains ten rooms; these also have paid five per cent., and already begin to pay the capital. Lady Ducie last Christmas bought the leasehold of six houses in the same Court. They also promise to pay well.

"Another lady has purchased a plot of freehold ground in the poorest district in Marylebone. A sum of £2,000 for building on it has been contributed by four ladies, and the plans are in preparation.

"In all these instances a marked change has taken place in the manners, habits and morals of the tenants, who in most cases are the same as were in the houses at the time of purchase. The rents have been rigidly exacted, and perhaps the sense of fulfilment of a duty has much contributed to raise the spirit and tone of the people.

"In keeping such houses in repair a great deal of carpentering, plastering, white-washing, and other rough work has to be done. In times of scarcity of work this forms a valuable means of giving employment, thereby assisting, without demoralizing the poor. Great care should be directed to supervising the cleanliness of the houses. Health more often depends on the way the house is kept than in its construction and appliances. The reckless destructiveness of this class of people has been greatly cured by setting aside a fixed sum for repairs and improvements, of which an account is rendered quarterly to each tenant, and if there is a surplus the tenants in turn decide how it shall be spent in improvements.

"In times of want *no* charity has been given, but work has when possible been found. The amusements of the tenants have been provided for as far as possible. Excursions in the country; social meetings in winter, concerts, &c., have been arranged, and have brought into more friendly contact the tenants, and those interested in them."

It is evident, from the above account, that the plan succeeded because Miss Hill, an intelligent, well-educated lady, fully appreciated not only the difficult and delicate relations of landlord and tenant under such circumstances, but knew moreover the influence she could exert for good over rougher and less cultivated natures.

I sought an introduction to Miss Hill, and I had long conversations with her. I had previously visited one of her houses. Her lady-like self possession, and accurate and prompt ways command the respect of every one who comes in contact with her. One feels that there is no sentimental nonsense about her, but a downright honest and clear way of looking at unpleasant circumstances, and an unswerving determination to carry out what she deems a simple duty. This duty would be to most people very irksome, nay, in many respects absolutely repulsive. Few would undertake it, because of this essentially disagreeable nature. What she has undertaken and has accomplished, most people would say was entirely "out of woman's sphere." I cannot present her plan to the Americans in any better way than by the following hypothesis:—

Suppose any lady in New York or Boston should say: I will buy the worst den at Five Points or in North Street, even if inhabited by cut-throats and garroters. I will become their landlady. I will call personally every week for my rent, and rigidly require it; I will give no charity, but will if possible provide work; I will enlist their sympathies by being myself interested in their welfare. If they are ill I will try to comfort them; if they are uncleanly, I will try indirectly to make them cleaner. I will occasionally induce the parents to bring the children out into the Central Park, or into the Public Garden, in order that they may feel the beauty of flowers, and may taste the sweet freshness of the pure air. I will try to open their eyes to all the fair things of art. Miss Hill has not only

proposed, but has actually done all this.* She has taken charge of houses in most wretched and low neighborhoods, in one of which the previous landlord had been a drunkard, and his tenants had copied his example. The filth of this place was extreme. The yard and wash-house were choked up with the nasty accumulation of years, so that it was impossible to use either, and therefore they had been definitely closed for some time. Very many of the windows of the various rooms were broken and filled up with old clothing. No paint had touched the house for a great while. The tenants were a wild, swearing, destroying race. Miss Hill gave notice to them of the change of landlords; told them she should simply clean up the house and repair some of the broken parts; that she wanted them to aid her by treating the premises properly; that she should ask for the rent previously demanded; that it must be promptly paid weekly, and that neglect of that bounden duty for two weeks would produce a legal summons to quit the premises.

At first no good result seemed to arise, as the next time she went she found even the new places injured, and at times wantonly broken. She said that she hoped such a result would not happen again, and that she had made up her mind to spend upon the house a certain sum annually for repairs or improvements, if actual repairs were not needed; that she should charge each tenant with whatever injury was found in his or her room. Of course, therefore, they would see that the better care they took the more would be left for the general improvement of the premises. Upon the precise method of expenditure to be made with the saved funds, she should consult the tenants each in turn, and perhaps follow his or her counsel. The result was all that could be desired. The manners of all improved. Instead of vieing with one another how things could be injured the emulation was to save as much as possible. Each tenant has tried to improve his own premises. The savings thus accruing have enabled the landlady to add a new story to the house, and to introduce an ample water supply. A playground for the children, and pleasant shady space for elders has been opened in front of the building. Trees are growing where formerly were dirty sheds, and green vines climb over walls formerly be-

* Since writing this I have heard of one similar undertaking by a young lady in Boston.

smeared with filth. The men have more self-respect, the women are more cleanly, the children are better clothed, and go more regularly to school.

Similar results have taken place in another dilapidated, doorless house, "a perfect rat-hole."

The previous landlord had been garroted and nearly killed on demanding his rent. Mr. Ruskin, though aiding with pecuniary means, deemed it almost hopeless even to attempt to do anything with such a place. But Miss H. succeeded. I asked to be allowed to go around with Miss Hill when she collected her rents, and she permitted me to do so. Into every tenement she went she quietly asked for her dues, but had some word to say about the family. The smiling and bright answers she got from almost all showed how different the relations must be between her and her tenants, than those which had existed between them and her predecessor. In one dark and dirty alley, however, I anticipated evil and rough treatment, for the agent informed Miss Hill that one of the tenants had sworn he would not submit to a summons that had been served upon him, to quit for non-payment of rent. We went our rounds, however, as if no remark had been made. We found the house in rather a poor condition. As it had been only recently taken in charge, there was some want of neatness about the stairs, &c. Miss Hill remarked upon it and added, "we have to *educate ourselves to wait in hope*. We cannot make them suddenly clean. For three weeks I have been trying to induce them to properly wash that window. It is, as you see, still dirty. They will, however, learn by and by."

At length we arrived at the upper part of the house, and entered a very low room, evidently inhabited by drunkards. Everything was disorderly and comfortless. A sulky, rough man, and a bloated-looking woman, his wife, were there.

Miss H. merely said, "Mr. ———, I learn that you decline receiving the summons. You will understand that it has been legally served, and if the rent be not paid next week, you *must* leave." He answered very doggedly, and *pounded furiously* upon the *shoe* he was mending, possibly to overcome the inclination he had to lay violent hands on his landlady. He was well enough able to work if he chose to do so, and could also pay his rent if he would not drink. This man was the

ruffian about whom we had been warned. A low muttering from husband and wife was the only reply, as we turned to leave the room.*

The whole visit was a very valuable one. It showed that the qualities named in the earlier part of these remarks were all that were needed. The last house I have no doubt will be redeemed and the tenants raised morally, as in the others alluded to, and disease, too, will strike them less generally under the mental, moral and physical cleansings that have been inaugurated.

I may mention as a proper finale to this whole story, that Miss Hill, when speaking of the gradual education of her tenants, remarked "that some of the lowest had so far risen in self-respect, and their means of support having consequently perhaps increased, they wished *to get into higher and better rooms, out of their old pathways!*" She had encouraged them to do so. In fact, she is now beginning to arrange a better class of houses, just above the level of these lowest dens, and hopes that she shall win many up to them, even if they have more rent to pay out of their small earnings in order to gain that end.

SUMMARY OF THE WHOLE INVESTIGATIONS UPON SOME OF THE MEANS NOW IN OPERATION IN ENGLAND FOR IMPROVING THE HOMES OF THE PEOPLE, AND THE RESULTS OF THESE OPERATIONS ON THE HEALTH AND MORALITY OF THE OCCUPANTS.

I have thus given five separate statements alluded to in the first portion of this letter. Although each can be read by itself, an important idea underlies and runs through the whole, viz.: that by improving the homes of the people; by making them neat and wholesome instead of filthy and stinking, we raise men, women and children to a higher standard of physical and moral health. The *first* paper entitled a "Night Stroll, &c.," proves that *English law* jealously guards the *public lodging houses* of the poor and vicious. It prescribes rigid rules in regard to cleanliness, amount of air, water, &c., for each lodger. At the same time the same law allows the *private*

*About three months after this interview, I asked Miss Hill what became of her rough tenant. "Oh," replied she, "he did very well. He forthwith paid his rent, and I have had no further trouble from him."

houses of the miserable and degraded of the same class to become by their filth, moral and physical pests of the neighborhood in vast districts in London. As an addendum to this paper, I have given another by which Boston seems to vie with London in its low tenements, and in disregard for sanitary law it is perhaps superior to the English metropolis.

Second. I have briefly described the Peabody and Burdett Coutts Buildings. I have given them as illustrations of philanthropy, and of its effects upon the dwellings of the laborers, and their results upon the health and morals of the people.

Third. I have shown in my notice of the operations of the operations of the "Improved Industrial Dwelling Company," how philanthropy and capital can join hands and each reap an ample return for its efforts made and for means given.

Fourth. I have indicated the workings of the Jarrow Building Company, in which the tenant, besides gaining all the advantages afforded by the preceding methods, is stimulated to become himself the proprietor of his own home.

Fifth. I have described the extraordinary and yet simple labors of Miss Hill, aided by the well known writer on art, Mr. Ruskin, Rev. Stopford Brooke, &c. By these labors the vilest dens of London have been reformed to neatness and morality by the personal influence of the individuals engaged in the matter, while at the same time the relations of landlord and tenant have been rigidly enforced, all money-giving charity has been virtually abolished, and with all this there has been an ample return for capital invested.

VI.

COMPARISON OF THE COMPARATIVE VALUES OF A MODEL LODGING HOUSE AND COMMON TENEMENT BUILDING IN BOSTON.

In the last year's report of your Board, you regretted that it was impossible to finish the account of the "Comparison of model lodging houses and common tenement houses, in their

relative effects upon the health and morals of the people." Though signed by the whole Board, the final statement really devolved upon myself, who had commenced the investigation.

Circumstances beyond my control compelled me very soon afterward to leave America, and I have been unable to make out a final report till within the past week, which renders it less complete than I could wish. I should regret this very much if I had not been able during my enforced absence to make the preceding investigations, which I deem, and I hope the Board will consider, not only not irrelevant, but rather, as it were, adding to the foundation of the practical results of our last year's investigations in Boston. To these results I propose now to draw your attention.

A thorough examination was made by Dr. A. L. Haskins, under the direction of the Board, and according to a certain definite plan of questions, at each particular tenement in two houses, viz.: the model lodging houses in Osborn Place, and the so-called "Crystal Palace," a common tenement building in Lincoln Street. Replies believed to be accurate, or nearly so, were obtained from these two. Subsequently, buildings in Stone's Yard, in Cross and Stillman Streets, Institute Avenue, Endicott Street, and Friend Street Court were seen. All of these are of the lowest and most degraded class of buildings. From all these last the returns were rather imperfect. In one, the proprietor compelled the tenants to eject our agent.

Model Lodging House in Osborn Place, Boston.

The results obtained may be summarily stated as follows:

The model lodging house consisting really of three brick buildings, provides a residence for poor families. They contain all the appliances for comfort and health provided by modern society, at a cheap rate, and yet large enough to be amply remunerative to the proprietors.

It is situated on the original soil on a somewhat elevated part of the city, where the tides never reach. It is five stories high, built of brick; is of a very neat appearance. It has an ample supply of fresh air around it. It has a large common entry, and private entries for each family home. Each family has 3 or 4 rooms with windows in each. There are 182 persons in the building, 65 of whom are children. The basements are

used for storage, not for dwellings. The buildings are generally clean and sweet smelling, save when, by carelessness, offal is allowed to remain longer in the dust-bin than is proper. The families ventilate their rooms by frequent opening of the windows. Sunlight enters every room. An average of 931 cubic feet of air is provided for each occupant. Each family has its own water-closet, which is kept scrupulously clean. There are no "privies" on the place. Cleanliness and absence of unpleasant odors are manifest everywhere. The drainage is excellent. Each family has its own bath-room in one building. Two common bath-rooms are found in the basements of the two other buildings. Thrift, neatness, quiet, and orderly deportment prevail throughout. All the tenants praise the building; dislike to leave it except when necessity compels a change of residence. The result to the proprietors is a six per cent. investment and the payment of all expenses.

The birth-places of the tenants are as follows:—

United States,	42
Ireland,	1
Nova Scotia,	1
Newfoundland,	1
France,	1
Germany,	1
England,	2
	49

The health report is as follows:—

It was good before entrance,	48.98	per cent.
Improved since "	24.44	"
Ill before and since "	14.29	"
Ill since,	14.28	"

The death-rate is much less than the average death-rate the city.

COMMON TENEMENT HOUSE, OR CRYSTAL PALACE, SO CALLED.

In striking contrast with this report let us now look at the aspect of the "Crystal Palace" in Lincoln Street. It is a large filthy-looking building, with brick ends, but chiefly of wood

Long open piazzas run in front and back of it at each story, upon which immediately open each sitting or living room. The ventilation depends upon the doors opening on these piazzas, and upon a small window adjacent, opening on the same. The bed-room, back of the sitting room, gets its only light and air from these two apertures.

Like the model lodging house, it returns a good percentage, but the rents are oppressively great. There are no modern appliances. The tides come up very near to the basement floor, but being built on made land no cellar exists. It is five stories in height. The air circulates freely around it, and the sun can reach some of the sitting rooms. It never penetrates any bed-rooms. There are sixty-two families. Each has only a sitting room and the dark bed-room above described. There are 295 persons in the building, 149 of whom are children. The basements are below the level of the street, and each family in them has four rooms, the bed-rooms being opened, and thus a passage is given through from the front to the back of the building. They are all damp, dark and dirty. Sunlight enters a little at the front door and window. Of cubic feet of air in the house we find only about one-third of what is found in the model lodging house for each tenant. No water-closets, but only a filthy privy in the yard is furnished the inmates. This privy was in a shockingly dirty state when our agent called; it was choked up. Odor from that and an obstructed urinal was very bad, even in November. No bath-room is found on the premises. Drunkenness and theft are not uncommon. None of the tenants praise the residence, though compelled to stay, owing to the cheap rents. Some were indifferent, and some even said they liked the place. The result to the proprietor is that he sub-lets to another who keeps a shop, and contrives to reap an ample reward, the exact amount being unknown. In other words, the house though so miserable in all its appointments, gives good returns of money to two persons from rent obtained.

The birth-places of the tenants by families are as follows:—

United States,	. . . . .	1
Ireland,	. . . . .	60
Nova Scotia,	. . . . .	1—62

The health report is as follows:—

Good before entrance,	67.74
Improved since entrance,	3.22
Ill before and since entrance,	9.67
Ill since entrance,	19.35

The death-rate presents some peculiar, not to say extraordinary results. Suffice it to say it was not so great as one would anticipate, save in the basements, where one-half of all the deaths occurred, and the death-rate there was higher than in the city at large. I forbear to give the few statistics obtained because further investigation on the point will be necessary.

Remarks on the above Statements.

I might well leave these vivid contrasts between the two buildings to speak for themselves. Health, physical and moral, are the results of the model lodging house. Less physical disease and less mortality are noticed in some parts of the tenement house, than one would anticipate; but intemperance and degradation of character are rife in them. From the former come neat, industrious, quiet, hard-working, temperate citizens and their wives and children. From the latter steal out some of our thieves, or stagger forth the reeling drunkards. Neatness of body and of dwelling is seen in Osborn Place. Beastliness of filth and noisome smells salute the senses in Lincoln Street. Sunlight, so bountifully shed upon every human being, is admitted to every room in the model lodging house. It is excluded, or but grudgingly admitted, in more than one-third of all the rooms of the low tenement, while into the bed-room, where the tender bodies of children spend more than half of their young lives, not a single ray can, by any possibility, enter. Ventilation is everywhere amply provided for in a manner appropriate to our climate, in the large entries, the windows in every room, and the ventilating shafts of the model lodging house. It is partially obtained in the tenement house only by opening the door or window in the living room, even in the depth of winter. This last fact, however, though, at first sight, it may seem a cruel exposure of a family, especially during the depth of our winter, is perhaps, a real blessing in disguise.

For the inmates, though exposed to bleak and sometimes to biting cold wind, gain by this frequent opening to the street of their single door a freer circulation of air, comparatively pure, than is given to some of those who live luxuriously in the stifling furnace-heated houses of fashionable quarters of the city.

Such are the general characteristics of the houses and of their occupants broadly considered. But it will be well to examine them a little more in detail, and in conclusion suggest certain obvious remedial measures that may be necessary, or at least allowable, in connection with the tenement buildings generally in the cities of Massachusetts. In this examination I will refer to various items given above.

No. 1. *Site of the house.*—There is no doubt that the site of the model lodging house upon the somewhat elevated native soil of the city is really better for the health of persons living there, than are many parts of the newly-made land composed of mud and filth of every kind, but on which some of the richest houses of our city now stand. Investigations in this country and in England have fully proved the fact that actual disease is more liable to occur in a house standing on a damp than on a dry soil. In choosing, therefore, hereafter, a site for a tenement house, we should not neglect this consideration, even if the effects of it be not strongly manifested in the present returns.

No. 3. The evil of using a basement for a residence is distinctly seen in these returns. The model lodging houses have well-lighted, dry, airy basements, legitimately used for storage. The low tenement house uses the basement for residences. It virtually slaughters human beings by so doing, the rate of mortality being very many times greater in the basement than in the rooms above it, and greater than that of the city at large. In the basement fever, diarrhœa, scrofula and consumption are liable to prevail, and if an epidemic occur, the dwellers in such a place are peculiarly exposed to its influence. The State should forbid any owner of a house to rent a basement. Proper inspectors should have authority to shut up such places as being dangerous to the public welfare. In fact, I think the law as it now stands, if enforced, could apply a remedy.

The comparative healthfulness of the two tenements is not so evident as one would have thought it would have been. But the advantages of the model lodging, and the disadvantages of its opponent can be clearly seen on a closer inspection. The returns from the model house may be deemed more accurate than those from the low tenement house, because, first, the character of the residents is higher, and second, there is always more willingness to tell of good qualities, than of the bad qualities of one's homestead. Making these deductions we can say: *First*, a smaller proportion of these entering the model lodging house were said to be perfectly healthy; but notwithstanding this, nearly one-fourth of all of them gained in health during their residence, whereas only a very small proportion in the tenement house said that they had gained in health. Of these latter, we may infer that the tenement house, poor as it was, was really superior in its hygienic influences to their previous residence. For, of these families, one had lost eight children by croup, lung fever and convulsions, and another five children within six years previous to their entrance into the tenement house.

Second. Five per cent. more fell ill at the low tenement house than at the model house.

Third. A severer form of acute and of chronic disease is found in the tenement house than in the model lodging house, as the following statement indicates:—

Diseases Reported.

In Model Lodging House.	In both.	In Low Tenement.
Effects of pregnancy.	Catarrh.	Rheumatism.
Congenital diseases.	Bronchial trouble.	Typhoid Fever.
Debility.	Whooping Cough.	Conjunctivitis.
	Rheumatism.	Bright's Disease.
	Lung Disease.	Children in poor health.
	Diarrhœa.	
	Scarlet Fever.	
	Measles.	

It may be remarked, moreover, that from the results obtained from Boston during the cholera, and other epidemics, and also from London and other large cities, the filthy state of the low tenement house, is just the condition upon which these, sometimes rapidly fatal, diseases seize with awful violence. Such places thus become real food for contagious influences, nuisances to all in the vicinity.

In comparing the number of deaths in the two residences results different from what were anticipated, have been arrived at. The question will arise whether there may not be some error in the returns. The only answer that we can make is that Dr. Haskins recorded carefully, and believed he got the truth. Even during the investigation he was surprised not to find greater discrepancies in the mortality, as reported by the occupants of the two houses, apparently so different. Nevertheless, there *is* a difference, and the model lodging house holds its preëminence over its rival, and over the city at large. Probably the fact that air circulates freely about this particular low tenement house, the "Crystal Palace," and that other fact already referred to, viz., that every time the door of the living room is opened the inmates have access to this air from the street, may so improve this filthy place that people live there perhaps in spite of, what usually are deemed, very pernicious influences.

It would seem, however, that there may be some deleterious power or powers at work in the community at large, upon the rich as much as the poor, that must raise the death-rate for the city at large. I would suggest the following considerations as bearing materially upon the mortality of the city at large, and which have little or no influence on the occupants of this tenement house. The almost universal use of closely fastened double windows, and hot air or water or steam heated rooms; the various exposures in dress; the want of regular physical exercise in the open air; the turning of night into day; the merry-makings of the rich, and long labors of the poor in ill-ventilated shops by day, and the night-watches of artisans at work for their employers; the long weary hours of the seamstress, &c.; the over-excited mental condition of society at large,—these causes, from most of which the tenement lodger is free, tend to raise the death-rate of the city.

When we look, however, at the terrible mortality connected with a residence in the cellar, or basement of the tenement building, and find that notwithstanding the greater freedom in the circulation of air in the bed-rooms of the basement, than in the rooms above (the bed-rooms being opened into one another so that a stream of air *may* be made to pass through the four rooms in which the family live), the death-rate becomes higher than that of the city at large, and that one-half of all the deaths in the building occurred there, we recognize the deleterious effects of a residence in that low, damp, dark and dismal place. Certainly here, if ever, the law ought to step in between landlord and tenant and should declare what the proprietors of the model lodging house virtually admit, viz.: that the basement is unfit for human habitation.

The part of our Report which gives the relative moral and individual conditions of tenants of the two houses, appeals to every humane instinct of our nature. We report the thrift, neatness and temperance that mark the model house, and on the contrary the filth, dirt, crime, drunkenness, and what is worse the apparently stolid indifference to their degraded condition that mark several of the occupants of the tenement house. The Rev. Dr. Channing used to say that the statement, if true, that the slave was happy in his lot, was no valid argument in favor of slavery, but rather one of the strongest arguments against it, inasmuch as the fact of his remaining satisfied and happy in such a lot, proved that slavery had thoroughly degraded all manly instincts. Hence when we read in our returns from the tenement house, that thirteen out of sixty-two families *liked* their wretched and filthy residence, and that twenty-one out of the sixty-two were *indifferent* whether they should go or stay, we feel the degradation to which human nature can fall. And we then turn with pleasure to the fact that forty-eight out of forty-nine in the model lodging house were *delighted* with their humble, but clean and healthy homes. Twenty-eight, however, of the sixty-two in the tenement house disliked it, and the reason for that distaste was the amount of noise, of drunkenness, filth, and possible theft that surrounded them. In other words, more than one-third of the dwellers in this wretched place virtually appeal, though mildly, like the poor Franciscan, to us for help. Should not help be extended to

them by some one? Who among our rich men are ready to come forward, and either individually, or by large combination of capital, erect model lodging houses like those described in this paper, or like those recently erected in London by the regal munificence of our distinguished countryman, Mr. Peabody, or by Sir Sydney Waterlow and Mr. Allen?

The examination relative to receipts for capital expended presents items that are eminently satisfactory from both houses. The income cleared from both is all that could be wished, notwithstanding the totally different class of building which gains the rent.

Prepayment for short periods, a week or thereabout, is the invariable rule in both. Doubtless much depends on the vigilance and decision of character of the proprietors, and of their agent. But when pure philanthropy and a steady six per cent. interest on capital can be combined, even the most practical common-sense business men need no longer stand aloof from this great undertaking of building suitable houses for the poor. In Boston this appeal is the more urgent at the present time, owing to the large improvements that are now making at Fort Hill, whereby thousands of our poor are driven from their homes, in order that their sites may be turned into vast thoroughfares of business. In this appeal let us suggest the following to the advocates of temperance. What human being is there who if compelled to live in such filthy homes as that presented by the low tenement house, would not be degraded and almost inevitably tend to drunkenness? Is not drunkenness, if for no other reason than to drown for a moment the sense of surrounding wretchedness, a most natural result? The cause of temperance thus becomes intimately blended with that of building pleasant homes for the poor.

Intemperance claims our attention under the law, and it strikes at the root of all health. Take away a man's or woman's self-respect, and you tend to drive them to low habits of body, and thence come disease and death. They no longer revolt at a filthy, unhealthy home. Place the same persons in clean, well-appointed apartments, where they can live in comfort with their families, and can attend to the decencies and proprieties of life, and they are lifted up morally; their intellect usually follows with an almost equal pace towards a true manliness and

womanliness of character and behavior, and with these comes a greater health of body.

But long before private charity and enterprise shall have erected homes for the poor, cannot the city authorities or the State do something towards improving this and many more tenements, equally or perhaps more degraded than the subject of our investigations?

By ordinance, the aldermen of the city of Boston act as a board of health for the city. By law they can examine all nuisances and order their removal. They can punish a man who disobeys the mandates of the board or council. They may notify tenants living in a place that proves a nuisance, and order its abatement.

They may even forcibly enter into any place supposed to contain a nuisance, and all opposers of their authority can be punished.

There would seem therefore to be law enough, if it were only carried out effectually.

Why is it therefore that such nuisances are allowed to exist? Is it possible that men can consider such places as not nuisances in the eye of the law? Surely anything that can add fury to a pestilence ought to be called a nuisance. These vile tenements do this. A basement that brings death at a greater rate than in the city at large, ought to be summarily closed as a place of residence, as a nuisance of the grossest kind.

This excuse therefore cannot be offered. The old-time maxim "What is everybody's business is nobody's business," really is the reason for the neglect. How can we expect the mayor and aldermen of the city of Boston to attend to such things? From the nature of the case it would be impossible for these officials to be able, if willing, personally to manage such details. It remains, however, as their duty, and they are bound by some means to abate such evils.

VII.

CONVALESCENT HOMES.

These noblest of charities and promoters of the health of the people, have recently sprung up in many of the chief cities of England. They do, perhaps, quite as much service to the poor as the various hospitals of the kingdom. They are intended—

1st.—To provide in the country rest from labor, and proper food and lodging for those who, while usually living and working in the crowded cities, become not really ill, but are in that condition, that if care be not taken, they will either fall into a state requiring hospital treatment, or become seriously and perhaps permanently ill.

2d.—To take care of that numerous class of patients who, having stayed a long time at the hospitals have recovered so far as to be discharged, and yet they are unable to attend to their daily work, and really need a few weeks of country air to thoroughly restore them to labor. Or

3d.—For perhaps an equally large class who, while having remained a long time at their own homes ill, are still unable to work, and do not seem to gain farther good from any remedy. Nothing has seemed to do them any good,—and their natures, as it were, unconsciously sigh for a breath of country life.*

For all of these classes of invalids the Convalescent Home is a boon of inestimable value. Almost every person in the larger cities of Massachusetts has seen such invalids, and has lamented, if he have thought at all upon the subject, that there was not such a sanitarium a short distance from his own town, to which he could direct the sufferer.

Only a few years ago (comparatively speaking) a gentleman in London met such a case in a young female who had been

* "What these persons want are not hospital comforts, however liberally bestowed, no medicines, however skilfully prescribed, but the natural restoratives of fresh country air, good food, gentle exercise out of doors, and that mental quiet and freedom from anxiety which cannot possibly be the lot of the laboring man, while struggling at once against poverty and bodily weakness."—*Report of the Metropolitan Convalescent Institution, 1856.*

discharged from one of the hospitals in that city, too weak to work, without money, and with hardly a spot on which to lay her head. She appealed to the philanthropist. He saw her wants, but had no means himself to send her even for a few weeks into the country. He appealed through the journals for means to attend to this particular case. That newspaper article was the nucleus around which similar thoughts in the community immediately crystallized. And from it has arisen the really fine practical result, which declares that *every community of any size, and each hospital in large metropolitan districts must have a convalescent home*, or be faithless to the duties of a high humanity, which requires of each individual and each State to promote as much as possible, and by every reasonable means the general health of all. I wish to bring to your notice three institutions that I visited, in order to personally examine their working.

First.—The oldest and most comprehensive is the Metropolitan Convalescent Institution. It was founded in 1840. It has three homes, viz., the Asylum at Walton-on-Thames, and two children branches. In these last are taken children from two to fourteen years of age; one for girls at Hendon, Middlesex; and another for boys at Witcham. It has a central office at 32 Sackville Street, Piccadilly, London. The asylum at Walton is a large new building erected in a dry and healthy, but somewhat uncultivated spot. It presents an imposing appearance,—with its broad front, and with grounds tastefully arranged with shrubs and flowers in that peculiar beauty of landscape gardening much seen in England at the present time. The interior has large and airy corridors opening into wards or saloons for sitting, eating, sleeping, &c. All these have abundance of sunlight and sun-heat during the day, and free ventilation during day and night. Nothing extravagant or expensive is observable, but everything is provided to promote that complete rest for the body and soul which the worn-out invalid needs. In 1856 (after sixteen years of existence) the directors report that 8,000 had been received from the opening of it. Last year they reported that the building contains 260 beds, and that the "total number received annually exceeds 3,000. Patients from the various hospitals and dispensaries, and from the crowded courts and alleys all over the metropolis, are con-

stantly being received into it, and they in general are able to return to their employment with their health fully restored in a little more than three weeks."

The Institution is under the patronage of the queen and nobility, and is supported by voluntary subscriptions of very many private persons. It has a board of management consisting of 27 persons, and four trustees. Honorary and attending boards of physicians and surgeons are connected with it.

"Annual subscribers of one guinea, and donors of ten guineas, have the privilege of recommending one patient yearly. Annual subscribers of two guineas, and donors of twenty guineas, two patients; and every donor of thirty guineas and upwards, and every annual subscriber of three guineas and upwards, becomes a governor of the institution, and has the privilege of attending and voting at the general meetings of the governors, and of recommending three patients annually.

"Every clergyman who either lends, or himself makes use of his pulpit for a sermon in aid of the charity, has the privilege, if the sum amount to twenty guineas, of recommending for admission one patient yearly for the term of ten years, and for every additional fifteen guineas so collected, one additional patient yearly for the same term, provided that the words 'sums collected' be held to mean the actual amount paid in to the Secretary of the Institution exclusive of expense of collection, and exclusive of donations and subscriptions, for which the donor may claim a separate privilege."

I have entered into these details because this institution was the first, and is perhaps the most complete in its organization, and I have wanted to present the subject in a practical and suggestive form to the citizens of Massachusetts.

The institution for girls at Hendon I visited. It is under the same management. That and its companion for boys, at Witcham, are smaller; but judging from what I saw when visiting the Home at Hendon, it is under capital management, and promotes greatly the health of the few children from London their present means allow them to receive. The children grow stronger and recover health, and leave the place with sorrow. The home is in a village sweetly situated about a half-hour's ride from London. A conservatory and large playground and open green fields are adjacent, and to all of these the children have

free access. From three to four hundred children have each passed three weeks or a month there during the past summer. Only those who can walk about are received. If confined to the bed they are returned to a hospital or to their home. They have plenty of good wholesome food and fresh air, and the physician visits the place chiefly to see these remedies are freely administered.

In the report of the directors, 1870, I find the following:—

"It would be superfluous now to enlarge upon the great advantages which attend the careful working of Convalescent Institutions. Dr. Chadwick says that 'no town hospital will be considered completely fitted for the discharge of its beneficent functions unless there be associated with it a Convalescent Institution at some distance in a country situation.'"

And this last remark naturally leads me to give a brief description of the magnificent Convalescent Hospital or Home recently opened under the direction, and for the sole use of St. George's Hospital in London.

It is situated a few miles from London, but fully removed from its noise and smoke, in the midst of a beautifully diversified, undulating country. It opens to the South, and the sun bathes it all day long. It commands an extensive view of at least a five or six miles' radius over hill and dale and woodland and cultivated fields. Flocks and herds quietly graze within view of the place, and the rooks caw over the adjacent fields. Everything is redolent of country life. It is a spot that of itself would prove a balm to many a sick soul wearied and almost worn down by London labor in a London atmosphere. It arose in this wise.

Mr. Atkinson Morley was one of the most active of the governors of St. George's Hospital. That institution needed more accommodations and Mr. Morley had determined to enlarge it. But difficulties arose about getting the land adjacent to the institution in London, and a suggestion was made, why not build a new establishment in the country which may prove a convalescent home as well as really a ward of the hospital. The result was that Mr. Morley left by will £150,000 for the object. By direction of the lord chancellor about £50,000 have been used in purchasing the land and erecting the building

leaving thus a large balance to meet current expenses. It has an imposing but very neat appearance. It is evident that while taste has presided in its erection, simplicity and economy have been sedulously attended to. It is built in the form of the letter T. The wards are grand in breadth and length, and fifteen feet from floor to ceiling. Ample room is given to each bed. The windows open to the south. The superintendent is allowed at present to receive one hundred patients only, fifty of each sex. It was opened less than a year since, and no report has yet been printed of the results. But no one can visit it and doubt for a moment of the immense aid it is destined to give its metropolitan parent, from whose wards alone the invalids are to come. The two are merely complementary, one of the other. Similar institutions ought immediately to arise in all the large cities of this country. Will Massachusetts take the lead in this most beneficent of sanitary measures?

The two methods of public hospital and of private benevolent subscriptions might easily be united. In Boston, for example, what prevents the united efforts of the various hospitals and of the Boston dispensaries with private charity establishing a convalescent home in some healthy suburb of the metropolis? And why should not Worcester, Lowell, Lynn, Fitchburg, &c., have each its "*sanitarium*" of the same nature? I suggest these facts and these reflections to the Board, and through the Board to the people of Massachusetts, in the sincere hope that they will tend to the practical result *of the establishment of such institutions wherever they may be needed in our State.*

VIII.

SEWAGE. WHAT SHALL WE DO WITH IT? THE EARTH-CLOSET. IRRIGATION OF LAND. DRAINAGE TO THE RIVERS OR SEA.

There is no single subject that is attracting more attention in England, and which excites (strange as the remark may seem to some people in Massachusetts) more heated partisanship,

than the vast questions looming up under the various names of "earth-closet," "water-closet," "sewage," "its danger to health," "its widespread and fatal waste," "its utilization as a manure," &c. In other words the great sanitary question of to-day throughout Great Britain is the economic removal from houses of what is deleterious to man, and the proper use, as a source of income, of what has been heretofore wholly wasted. Thousands of pounds sterling are annually sent from England to Egypt to gather up the old mummied remains of past centuries of men, or merchant vessels sail round the world in order to gather the fæces of birds, that perhaps for equally long cycles of time have brooded over some one or more of the beautiful islands of the Pacific Ocean. And all this expense is incurred, while actually throwing away immense quantities of a material having the highest fertilizing qualities.

These vexed questions cropped out and were bandied about from section to section of the meeting of the British Association for the Advancement of Science, recently held at Liverpool, and presided over by the celebrated Huxley.

First. The section on health spoke often of it in regard to sanitary measures. Then it occupied an entire session of the engineering department. Finally, it absorbed much of another session of the chemical section in hearing public reports on the subject, and in listening to the appeals of Mr. Forbes for his plan of so "*throwing down*" all the substances deleterious to health, while saving them for manures; and he informed us that he did that so thoroughly and cleansed the sewage water of the Thames. Mr. Forbes was willing to pour into a wine-glass a portion of the water thus purified and, martyr-like (as some of us thought), sipped it in our presence to prove its perfect innocuousness and sweetness! These questions, more than any other, were in fact the *marplots* of many sections and had to be frequently suppressed, or rather *repressed*, by the presiding officer of the particular section in which it appeared. For example, the chemist kept the discussion simply to the chemical aspects of the question, and all engineering or simply sanitary ideas were sedulously kept away. They had, strictly speaking, no right in the laboratory. And so it was with the other sections. I mention these facts simply to prove the great and wide-spread interest in the subject.

In the social science programmes, widely distributed during the meeting of the British Association, it was distinctly brought out as a reason for going to Newcastle-on-Tyne that the subject of sewage would be thoroughly examined in all its bearings upon the health and prosperity of the community. Induced by that fact I attended that meeting. The subject was every day brought up in some way or another in the health section, and I soon found that partisan violence was not confined to republics alone, nor to political parties, nor could theology ever produce more bitter denunciations than were poured out by one party upon the other upon this subject. If I had not been amused I should have been indignant at hearing men whose works I have read for a quarter of a century, and thought were men of consummate wisdom, sagacity and coolness, use language worthy of Billingsgate toward an unlucky and persistent supporter of the "earth-closet" idea. This poor, abused article, which many have found so serviceable to their houses, and private rooms, would have been utterly annihilated if the venerable statistician and writer on health could by any word of his have gained that end. One opponent of this unhappy article declared, for his part, that he was unwilling to "take counsel" from so foolish a creature as the cat who, from the time of Noah, has quietly been teaching what Rev. Mr. Moule proclaimed, *ex cathedra*, only a few years ago. Dr. Farr at length came to the mediation of both parties by suggesting that, after all, both had the same object at heart, viz.: the disinfection and removal of unwholesome articles from our homesteads, and the only diversity of opinion was on a minor point, viz., the method to be pursued for that disinfection and removal.

Surely a subject that excites so much attention in England as a sanitary and economical and, incidentally, a vast engineering measure deserves our candid attention. I cannot throw much light upon the subject. Nevertheless, as I looked into some of the practical schemes now in operation, I propose to give to the Board the results of my experience in this matter. I begin with the

Earth-Closet.

I saw this in full operation in two places, viz.: at the villages of Halton and Beverly near Tring, and at the International Hos-

pital at Bingen on the Rhine. In all these places it was a perfect success. Halton and Beverly are small villages containing about fifty families each. Till Mr. James, an intelligent gentleman residing in the neighborhood, introduced the earth-closet system, every family either had its own privy close to its own premises, or used one in common with others, thus contaminating, as I learned on inquiry from the tenants, the houses in which they lived. About five years since Mr. James, being annoyed by effluvia from the privy adjacent to his own house, and which he vainly endeavored to remedy, tried Mr. Moule's system and with entire relief. Accordingly, with an excellent public spirit, and the sagacity of a practical farmer, he determined to persuade his humbler neighbors to adopt the same. The plan he pursued was as follows: Under a few small sheds he arranged an iron plate three-quarters of an inch thick, about four feet square, and raised upon bricks about a foot from the ground, to allow a fire to be lighted under it. The brick walls rise two feet above it. Thus a large pan or furnace with a strong iron bottom and brick sides is made for drying the earth. A load of earth can be dried sufficiently by one night's subjection to this heat. Half a load answers for a family of six for three months. He has used upon his land from eighty to ninety of such loads, after having passed through the closets twice. The result has been excellent. All the crops have been superior to those produced on neighboring estates treated on the old plan. The manure acts better than London manure or guano; especially does the amount of grass very greatly increase in quantity and apparently in quality.

Meanwhile the villagers find a great relief from the use o it.* All odor is absolutely removed—what was a nuisance an discomfort, to say the least, headaches, &c., not to allude t higher dangers which some sanitarians claim to come fro and which do at times undoubtedly come from the taint o privies and bad-smelling drains; all these have disappeared. conversed with the villagers, and all who have employed like the method. A man is kept continually employed by M James to dry the original earth, to carry enough for a week turns to the various houses, and to remove that which has be

* It is used now by five-sixths of the families, and in two schools of 200 children with equal success in all.

mixed with human excreta, liquid and solid. This by the subtle alchemy of nature, is found to be simply a dry, disintegrated pulverulent gray mass of inodorous matter. Even paper wholly disappears in it. The accumulations from the various families are placed under sheds opened in front, so that free access is given to the external air. After three months it is again dried and used anew. I visited these various places, the privies, the sheds, furnaces, &c., and found no perceptibly unpleasant odor, even in that portion most recently taken from the village. It was evident that arrangements could be made for boxes (earth-closet privies) of any size requiring removal, either by the week or year. All would be alike inodorous and cleanly. Surely here was a success in every respect. The village health and the purity of the home were improved, with great pecuniary gain to the far-seeing farmer, and the waste which was previously allowed of valuable manure was no longer possible after such positively good results. The earth-closet cannot be styled a "quackery," as the venerable ultraist of the water-closet system called it at the social science meeting at Newcastle.

I saw the same system carried out at the International Hospital under Dr. Thudichum. At one end of the camp street a furnace has been erected similar to that at Halton. Each hospital tent has its own earth-closet, and it was absolutely devoid of smell, so far as I could judge, and the surgeon in charge had found it to act perfectly as a deodorizer, and without any of the unpleasant accompaniments that chloride of lime and other disinfectants usually carry as a necessary result of their use.* Similar results have followed its use in America, and it therefore should be considered as an invaluable addendum to modern civilization.†

*Mr. Edward C. C. Stamford, F. C. S., Chemical News, April 19, and Oct. 22, 1869, advocates the use of pulverized charcoal as being very efficient, being much less bulky than earth. He employs sea-weed charcoal. Mixed with the excreta, the whole soon becomes an inodorous dry mass which can be used again, and if need be reburned. One cwt. of charcoal will serve for a month in a closet used by six persons, and may be allowed to fall into a cess *pit* under the house.

†For a most thoroughly exhaustive examination of the earth-closet, and a detailed account of its use in villages, towns, &c., in England and elsewhere, see Dr. Buchanan's admirable account in the last Report of the Medical Officer of the Privy Council, 1870. I read Buchanan's paper after preparing this letter, but preferred not to alter my own statements, as they did not clash at all with the results obtained by that gentleman.

But it will be doubted whether its use can be extended with sufficient ease to large cities, although the earnest advocates of it claim that it is perfectly easy so to do. I will not pretend to discuss this point, but will describe two visits I made, in order to observe two applications of the water system. They present, both of them, examples of what is now constantly being done in England, viz.: of the carrying away of materials supposed to be always, and certainly at times, very destructive to human health and often causing wide-spread mortality.

A few years ago the Thames became so offensive to the nostrils of all the citizens who came near it, that with one accord the believers in the actual noxiousness of these exhalations from it, polluted as it was by thousands of water-closets, and all others who did not like to have any unpleasant smell come betwixt "the wind and their nobility" even if it be not unhealthy, united for the cleansing of the Thames. Accordingly, the city of London under the "engineering skill" of Mr. Bazolette, made two immense sewers, one on each side of the Thames, from the metropolis down to short distances below the two villages of Barking on one side and Crossness on the other. At these two spots, by means of huge openings closed by an elaborate system of gates, the flood of water from all London, after being dammed up for some hours, is twice daily at high tide let out into the Thames. 1st, To waste all the manurial qualities it contains. 2d, To contaminate the villages near and below these outlets on the Thames. This is strongly urged by some and with some show of argument drawn from special cases of local infection from drains, &c. By others and by thoughful physicians and sanitarians too, this broad assertion is doubted—as one eminent member of the medical profession (whose works at the present time have much influence) said to me: "It was the *stink* rather than the proved unhealthfulness of the emanations from the Thames that compelled the city to carry the water-closet draining to Barking." This was accomplished at the enormous expense of £4,250,000, or £180,262 per annum, the cost to be paid off in forty years by rating"* 3d, To gradually fill up the Thames, and thus seriously to interfere with navigation. This too is doubted. A parliamentary commission, on investigation declared both of the

* A Chemist's View of the Sewage Question. Chemical News, 495, p. 6.

latter propositions false. But one can hardly see how if sewage emanations be pernicious to Londoners, they should not be so likewise to simple villagers.

I wanted to see and judge for myself, so far as I could by inspection and conversation with the inhabitants, what effects had been produced, and what would be the influence on my own senses of the emanations at the outlet. Accordingly I visited Barking, and fortunately met Dr. Parsons, the officer of the Union in that town, an active, earnest and thoroughly accomplished physician, one too who has the power to examine carefully facts, and to modify his opinions, if need be, under the influence of facts. He had joined with his fellow citizens in protesting against the allowing of London sewage to enter the Thames two miles below Barking. He felt persuaded that it must be injurious. He was called upon by the government commission to present facts, and he began to collect them under the impression that the result would be as he and his fellow citizens had supposed. But he has found that death statistics do not at present (after a lapse of two years' exposure) sustain that view. Seventeen per thousand living is the death-rate of Barking. He was surprised at this result. He remembered, moreover, that he had not been especially called to persons residing near the outlets, and there was no greater amount or peculiar character of disease prevailing there than at other spots in his circle of practice. Dr. Parsons drove me to the outlet. Our course for nearly half a mile was directly upon the top of the drain. Every few yards I saw gratings of iron, which I learned were the ventilators of the sewer, but I observed no special odor arising from them as I had expected. We were driving simply over a smooth greensward. Arrived at the mouth I placed myself directly over the partially running stream. It was low tide, and I could see the whole of the opening. I stood over the ventilator just above the gates, and where I knew that there was a large quantity of sewage water. I was still more surprised at the absence of odor in all these places. The keeper of the gates has a house and rears a family above, and between them and the outlet into the Thames. He assured me that he never observed any peculiar odor, and that his family enjoyed good health.

The inferences I was obliged to make were: 1st, That by

some means unknown to me the excreta had become deodorized during the water carriage; and 2d, That at present there was no proof that this deodorized sewage water of London does actual harm to those dwelling near it. I remembered Boston and other cities of Massachusetts with a sense of, at least, partial relief to my previous thought that a drainage that merely empties our water-closets into the docks around our city must inevitably be injurious to the health of our citizens. It is true that I am not aware of any city in Massachusetts having such *long* sewers as those from London, and therefore Boston, Charlestown, &c., have not exactly analogous circumstances with those of Barking and Crossness.

But there is one fatal defect of London and of all American sewage, and that is its waste. Probably there is no such widespread recklessness of spendthrift prodigality anywhere so noticeable among civilized nations as this throwing away of such vast amounts of this most excellent of manures. We take thousands of tons from the earth annually, and totally ignoring Nature's law of economy, which declares that what has been once taken away must be returned again to earth, otherwise the earth itself will become impoverished and will refuse to labor for us, I say totally ignoring this law, we squander an immense amount of really valuable property.*

Among those who have protested against this wholesale waste none has been more prominent than William Hope, Esq., V. C.,† the lessee of the now famous Breton Farm. By his energy a bill was passed by Parliament at its last session, authorizing a company to use this wasted material. For some private reason the measures intended to be carried out by its provisions have not been inaugurated. Meanwhile Mr. Hope took the Breton Farm under the following circumstances. I visited and examined his works, and propose to give a slight account of what I saw and heard there.

* It is calculated that not less than £1,000,000 is annually thus thrown away by London alone. Digest of Facts relative to the Treatment and Utilization of Sewage. By W. H. Corfield, M. A., M. B. Oxen, &c., &c., for the Committee of the British Association for the Advancement of Science. McMillan & Co., 1870.

† Mr. Hope (see address for London Society of Arts, Feb. 25th, 1870, Journal, p. 299, vol. 18) takes the strongest grounds on this matter, and claims that English pauperism is vastly increased by this wholesale waste of material, which if used according modern science and with modern appliances, would enable a vast deal more of cheap f to be raised.

The town of Romford contains 8,000 inhabitants. It was desirous of a better system of sewage, and having introduced a supply of water, conducted its sewers into the adjacent river. This the inhabitants living below the town protested against as polluting the water they had previously had pure for use. An injunction of the Lord Chancellor was laid upon the town authorities, who, in looking around for a remedy, bethought themselves of using the whole for fertilization of the Breton Farm, about three miles from the town. Accordingly the sewer mouths opening on the river were closed, and a system of drainage by large iron pipes conveyed the sewage to the Farm. For some unknown reasons the plan was not successful, and Mr. Hope came to the rescue, and has taken the land at less than £3 per acre, and as he pays about £6 per acre for sewage from the town, the sum is less than £9 per acre for all expense of hiring land and manure. He commenced twelve months since, and the first crops were put in last March. The result, though in every respect gratifying as a pecuniary investment for Mr. Hope and as a sanitary measure for the town, cannot as yet be thoroughly estimated until after a longer trial. I visited and examined the farm thus laid out for cultivation. It is on a tolerably level piece of ground, but by means of his steam-shovel Mr. Hope levels and arranges, with tolerable ease, very uneven surfaces.

A large cemented reservoir receives the water from the pipes. It is a thick, dark fluid; but strangely enough, scarcely any odor comes from it. It is pumped by a steam-engine into a tank and distributed in a fluid state by means of open iron troughs where the height is too great, and cemented pipes where near the ground. These troughs are a foot and a half broad and equally deep, and rounded at the bottom. The cemented ones have apertures thirty feet apart, with gates for closing when necessary or for communicating with gutters in the ground which run in straight lines 150 to 200 feet. In this way the farm is divided into several rectangular lots which give an opportunity for rotation of crops. The extraordinary growth of every plant thus fertilized draws the attention of every visitor. Carrots, four and a half inches in diameter at their top, and a foot long! Mangolds, twenty-nine and thirty-six inches in diameter, and pressing up like huge monsters from

the ground. Cabbages, huge and compact. Immense beds of rich and firm cauliflowers. Potatoes, eight or nine inches long, and weighing at times two lbs.! Hay, of delicate fibre and eagerly sought for by cattle, can be raised in three crops annually, and in quantity five acres produced twice as much as twenty-five treated by the usual former method. I leave all these results, however, for the practical farmer and agriculturist of Massachusetts to consider, and will finish this brief sketch of the whole subject with two cautions in a sanitary point of view.

While walking over the ground I perceived that the grass had the rich green usually noticed in wet lands, and my shoes often came into muddy spots, while no spot over the entire surface was dry. The whole land was in fact filled with moisture, doubtless fertilizing and raising crops unheard of previously. But I remembered two well established facts upon which I base two sanitary cautions: 1st, moisture of the soil is now fully proved to be a promoter of consumption in England as in New England. Probably the same law, modified doubtless by circumstances, holds good everywhere. Hence the workmen should not live in houses too near such sewaged earth, but rather on dry, elevated spots a little removed from it.

2d. Sewaged water has heretofore and may hereafter contaminate wells of drinking-water. Hence great caution must be, for the present at least, observed in the use of wells that are in the midst of such earth.

One very serious difficulty arises in the use of sewage water in this country as practised at Breton Farm. The irrigation is continued with ease in the climate of England during the winter. The heavy snows and freezing cold of a New England winter would seriously obstruct similar plans here, and although perhaps these difficulties might not be insuperable, they would have to be taken into serious consideration by any one who should propose to try irrigation in our Northern climate. The same objections do not exist against the earth-closet. The question arises whether at times both methods may not be used, but at different seasons of the year.

Final Appeal.

For all these various sanitary and philanthropic measures what need have I to add a single word of appeal to the capital-

ist and philanthropist of Massachusetts? Is there anything but the *will* and *individual* and *coöperative* action needed in order to inaugurate in our State systems similar to, at least, some of those described in this communication? Who are prepared to give to all laboring men neat and healthy homes? Without these it is all vain to try to raise the people to a proper self-respect, and enable them to bring up their children in a manner worthy of a great and free Commonwealth; and some of these children must inevitably become the future parents of the State.

Who will spring forward to aid the heavily-burdened laborer, or seamstress, or shop-girl, or hospital invalid, all sighing for a breath of country air, and of their abundance will build and amply endow convalescent homes?

What farmer or town will, while removing sources of disease and mortality from house or town, follow the dictates of Nature and utilize their sewage, or at least deodorize it by the use of the earth-closet; or by the more thorough and more expensive plan of irrigation, make use of it?

All these questions I submit to the Board, as guardians of the public health.

Respectfully, your friend and colleague,

HENRY I. BOWDITCH.

Appendix A.

Summary of English Law in regard to Common Lodging-Houses.

The two Acts for "the well ordering of Common Lodging-Houses" of England under which the police act, were passed July 24, 1851, and August 4, 1853.

Their provisions are as follows:—

The Act is to be executed either, 1st, by the Commissioners of Police of the Metropolis; 2d, Local Boards of Health; 3d, Mayor,

Aldermen and Burgesses of the Borough; 4th, Commissioners, Trustees or other body by whatever name known, for executing the "Improvement Act" (an Act which was passed relative to paving, drainage, lighting, watching, etc., of any place); 5th, Justices of the Peace acting in petty session for the place.

The expenses are to be charged to the general accounts incurred under each of the above departments.

Notice is to be given to each Public Lodging-House keeper requiring him to register his house.

Which register is to be kept by the local authority.

After one month's notice no lodging-house to be used as such until "inspected and approved" by the "local authority," and registered.

The "local authority" may make regulations for governing such houses, which must be approved by one of the principal Secretaries of State.

Penalties may be imposed by "local authority" for violation of such regulations.

The keeper of a Lodging-House must give notice to the Medical Inspector of cases of contagious disease.

He shall allow the Inspector to enter when he may think proper.

He must keep his premises clean, to the satisfaction of the authorities, and attend to drains, privies, &c.

He may be fined £5 for neglect of any of the regulations, or imprisoned if he do not pay, or for third offence may have his license taken from him.

The above are some of the items of the law of 1851. That of 1853 confirms the above, and adds,—

That unless a Lodging-House keeper can get a certificate of good character the register of his house may be refused.

The "local authority" may require a more perfect supply of pure water.

Sick persons affected with infectious or contagious disease may be removed to the hospital, and their clothing disinfected or destroyed at the public expense.

Reports of those who resort to the Lodging-Houses may be ordered from keepers.

The "local authority" has power to remove nuisances.

CORRESPONDENCE

CONCERNING THE EFFECTS

OF THE USE OF INTOXICATING LIQUOR.

REPLIES

To Inquiries concerning the Effects of Intoxicating Drinks on Public Health, received from our Correspondents in Massachusetts.

One hundred and sixty-four (164) correspondents have answered the following question :—

"What, in your judgment, has been the effect of the use of intoxicating liquor as a beverage upon the health and lives of the people in your town, or in the region in which you practise?"

The replies are as follows :—

Very destructive to life and health,	48
Injurious in a greater or less degree,	49
Public health not affected by use in their towns,	16
The people of their towns very temperate,	27
Intoxicating drinks not used in their towns,	5
The effect is bad upon foreigners in their towns, but not upon natives,	4
Useful in the decline of life,	1
Use promotes longevity,	1
Indefinite replies,	13

The following extracts from letters give more information on this subject :—

"I am satisfied that the free use of intoxicating drinks is a moral evil that tends strongly to injure the physical health."

"Observation has satisfied me that the use of intoxicating liquors as a beverage does not improve the physical or mental system, but is adverse to the best condition of both. I am positive that drunkards die from consumption."

"As far as my observations extend in a practice of more than thirty years, the use of intoxicating liquors has not been injurious to the health or shortened the lives of those who have used them temperately. The intemperate use of alcoholic drinks, and other excesses to which it leads, has caused the death or shattered the constitutions of many young and middle-aged men in this vicinity; but rarely do I meet with a very old man who has not been in the habitual use of stimulants in some form, and accustomed at the same time to active exercise."

"Among the American population, not an individual is known whose health has been injured by drinking. Among the foreign population, there is hard drinking on Saturdays and Sundays,—and in some cases (but few, however) general health has been thereby injured."

"Intemperance in the use of intoxicating liquors, with the usual concomitants, lewdness and debauchery, are the causes of a very large share of the diseases I am called upon to treat in the State Almshouse."

"I do not think intoxicating drinks have any general influence on the health of the people in this town. Individuals have, however, been known to be seriously injured. It is not to be generally procured, and those who use it are obliged to submit to long intervals of total abstinence."

"I have had occasion to see but few cases of suffering directly from the free use of intoxicating liquors, but these have been sufficient to convince me that such use is detrimental to health and life."

"Delirium tremens less common now than formerly, but we see, as effects of intoxicating drinks, a trembling gait, and general debility of nervous system, and I have been led to think that these symptoms might be due to adulterations, rather than to alcohol."

"The health of the inhabitants of this town I do not think is materially affected by the use of intoxicating liquors; there are those who say they almost die for the want of them."

"There is no great abuse of intoxicating liquors in this place. Their influence on public health is small."

"I do not think that intoxicating liquor has been used as a beverage to such an extent or degree as to produce a perceptible effect upon the general health and lives of the people in the region of my practice."

"Intoxicating liquor has invariably proved a curse to those who used it as a beverage."

"Injurious wherever habitually used. Has destroyed many lives in the fifty years of my observation."

"Not injurious unless taken to excess."

"Intoxicating liquors have greatly injured the health and lives of those who use them habitually as a beverage."

"As regards the use of intoxicating liquors, I believe that there are individuals who would enjoy better health than they now do if they would use them temperately. But there is vastly more suffering from intemperate use than from abstinence. On the whole, I think we should be more healthy, wealthy and wise if they were entirely banished from society."

"I have very few cases of sickness which I am able to trace to the use of intoxicating liquors. Many aged persons are within the range of my observation who have always used liquors as a beverage without apparent injury. I have the impression that in this region persons who habitually use spirits are less subject to lung diseases than are the average of total abstainers, but I can give no exact data to prove this opinion."

"To answer the question regarding the use of intoxicating liquor as a beverage, we must divide the inhabitants into two sections, natives and foreigners. There is no excess with the former in this community. The foreigners, particularly the Irish, many of them drink freely, and the result is most disastrous to them. Health is injured, and lives prematurely destroyed."

"Intoxicating liquors the source of much existing disease."

"The use of intoxicating drinks has been so far as I can judge only productive of evil, and he who uses them has need to say often the prayer of St. Chrysostom: 'God keep my body from the doctors, my money from the lawyers, and my soul from the devil.'"

"The effect of the use of intoxicating liquor is here, as everywhere, injurious to health and destructive to life. Never useful as a beverage, and seldom, if ever, as a medicine. The users are not the only sufferers, but they leave to their children an inheritance of bodily and mental disease."

"I believe that three out of four adult males use intoxicating drinks as a beverage, or on small pretext, but I see no effect upon health. Those who drink at the hotel, all belonging to the laboring class, are not sick oftener than others, but suffer in their pecuniary and social interests."

"Intoxicating liquors are extensively used, and by a proportion of all classes. More was used in 1869 than in any previous year since 1857. No disease resulting from its use has come to my knowledge."

"I think people who use liquor moderately here are less liable to disease than those who do not. They are also as long-lived. Used excessively it produces disease. I think, if liquor was pure, the moderate use would be conducive to health, especially in those of attenuated habits."

"Intoxicating liquors have injured health and shortened life in proportion to their use."

"There is no very marked effect on the life and health of our people from the use of intoxicating liquors. The Irish use it most, but only a few instances could be pointed out in which very special mischief can be attributed to it in regard to life or health. Of course there are cases of unthrift, of squandering, of family abuse, &c., such as must naturally arise from the gradually benumbed conscience."

"Intoxicating drinks have a decidedly injurious effect upon life

and health, and are far too much used in the treatment of disease. Tobacco is doing even more than liquor to undermine the constitutions of the men of this region."

"The abuse of alcoholic liquors is a fruitful source of both crime and disease; but their use under certain conditions appears to me to be indispensable."

"The effects of intoxicating drinks among our inhabitants have been rather moral than physical."

"The use of intoxicating liquor has a very injurious effect upon our inhabitants. We are but three miles from the New York State line, where liquor is sold freely; and our poor Irish laborers spend their money for that which brings them only sickness and poverty, with all its privations and exposures."

"The same general law operates here as elsewhere. They who sin through intemperance suffer its penalties. The amount of sickness and the rate of mortality are increased by the use of intoxicating liquors."

"Temperance is the rule; intemperance the rare exception here. I remember one man who killed himself by the daily use of N. Y. brandy, and another who drank all the N. E. rum he could get, but would drink no other form of spirits, and who was intoxicated the most of his time, who lived to the age of ninety-three."

"The effect of the use of intoxicating liquor has been to ruin health, and shorten the lives of the people."

"Predisposes to fever and rheumatism, and shortens life very decidedly."

"In my judgment a very disastrous sequence of results follows the use of alcoholic liquors as a beverage. They impair the vigor and elasticity of the body, and impede the functions of its organs; they produce diseases of the nervous system, and I have no doubt of their hereditary influence."

"Injurious always, from first to last."

"Impaired health, shortened lives, feeble offspring."

"The cause of much debility and disease."

"Better health and longer life would have been secured had the population abstained entirely from the use of intoxicating liquors as a beverage."

"The effects of alcoholic drinks are plainly seen in the families of those who in past years drank to excess. Tobacco is now doing more to shorten life than liquor."

"When I came here forty years ago there were three stores and four hotels where liquors were sold, and they all prospered,—they sell none now. The difference is very visible. Comparing the past with the present confirms the belief that the use of liquor as a beverage is very injurious; that it often acted as the primary or predisposing cause of hepatitis, gastritis, enteritis and rheumatism. If there was a proclivity to any disease, it often excited that latent principle to action, and hastened it on to a fatal issue. It has been, and still is injurious to the health of the individual, to the health and happiness of his family, and to the treasury of the town."

"I think that the use of liquor impairs the health, and has shortened the lives of some, especially when used to excess. I think that persons who drink liquor do not bear up under acute attacks of disease as well as those who abstain from its use."

"The use of malted, fermented, or distilled liquors in this place has affected neither the health or lives of the people to any extent."

"Intoxicating liquors kill more than all diseases."

"My impression is, that the use of intoxicating liquor as a beverage not only exercises a very pernicious influence on the moral and

social condition of our people, but undermines health and shortens life."

"I know of but few instances in which such liquors are used at the family table; in those few instances it is mainly wine, and I think it beneficial. The drinking of ale and distilled liquors at secret bars is sufficiently common to come to my attention as cause, direct and indirect, of no little disease. Were open bars allowed I know no reason why this evil should be less."

"On the whole, the effect is injurious. I should, however, make a distinction between the use of intoxicating liquors and the lighter drinks. If we could so manage as to furnish the people with light wines, lager beer, and such drink, and dispense with distilled liquors, I believe that the community would be immensely benefited."

"I have had a large practice among the Germans for twenty years, and my observation has been that they are remarkably free from consumption and chronic diseases. I have attributed it to their free use of lager beer. I believe that the moderate use of the lighter drinks is beneficial."

"Many persons can use liquor as a constant beverage without injury to their health, but I am confident the majority cannot, and are injured by its daily use. My judgment is that the health of the people would be better and their lives longer without the use of intoxicating liquor as a beverage."

"People very temperate. A very few persons use liquors excessively and thereby injure their health and perhaps shorten their lives. One instance only, I now remember."

"I know of no disease in this town traceable to the use of intoxicating drinks."

"From a comparison of the habits of life of the aged persons, who have died here since my remembrance, I have formed the opinion that a moderate use of spirits has no tendency to shorten life, or impair its vigor; while an immoderate use tends to produce both these results. I am not partial to its use in consumption. In cases

tended with bleeding from the lungs it shortens the disease by ıortening the life of the patient."

"Effects injurious, and more so of late from the bad character of ıe liquors sold."

"There are cases where the use of intoxicating liquor as a bev-ıage is useful, especially in the decline of life. Where the body is radually becoming weakened by age its use in moderate quantities, f good quality, taken with regularity, has a tendency to keep up he tone of the system, and to prolong life."

"Unfavorable to health. The same may be said of strong tea and coffee."

"When used temperately such liquor has seemed to do no harm; when used intemperately its effects are disastrous."

"I cannot see but that moderate drinkers are as healthy as any."

"I have observed no peculiar effects on health in this town from the use of intoxicating drinks, but the habit of opium-eating and the use of preparations of opium demands attention."

"We have little intemperance, but it is found to be invariably destructive to health and life. Moderate drinkers suffer from the habit when attacked by ordinary diseases."

"Happily we have no grog-shops, no place where liquor is sold. But very few of our people are habitual drinkers. The blighting curse of rum is not upon us."

"We see but little disease caused by intoxicating drinks. In more than thirty years I have seen not more than two or three cases of delirium tremens. Among the few persons using such drinks, we see diminished ability to labor, and such diseases in their families as are engendered by want, care and discouragement. All

cases of *gangrene senile*, which have come under my observation have been persons accustomed to indulge in strong drink. Most cases of cancer have been either among hard drinkers or their immediate descendants. My own belief is that the use of intoxicating drinks, combined with the free use of pork as food, constitute a prolific source of cancer. Confirmation of this belief, of course, needs a far wider sphere of observation."

"This is a quiet farming town, without a railroad until the present year, and there have been but few persons addicted to the use of intoxicating drinks. But in such cases the effects are unequivocal. Sometimes death from delirium tremens, or from accidents occurring while intoxicated. In others, where the liquor is used more moderately, its subjects are rendered more irritable, more easily affected by disease, and less likely to recover from it. I have had many patients whose life or death was apparently determined by their previous habits as regards the use of intoxicating drink. I have often noticed also that one or more of the children of a drinking parent possessed a feeble constitution, or mental incapacity, or both, and perhaps a scrofulous tendency. But this is not true of the children of all such parents. The propensity to drink is also sometimes transmitted, although not very generally, because the children are warned by the effects which they see. I recall the family of one notorious drinker, but one of whose children was addicted to the habit, but several of whose grandchildren (and not sons of the drinking son), inherited the propensity. On the whole, therefore, I judge that the effect of the use of intoxicating liquor as a beverage is deleterious, and frequently ruinous to the health, and that it very often shortens the duration of life."

"There is a great deal of intoxicating drink sold in this town. The population is but little over two thousand, and there are probably a dozen places where it can be bought. I do not propose to discuss the effect of this from a moral point of view, but to speak of it physiologically. I am of opinion, as the result of observation, that the use of these drinks is the cause of ill health not so much to the drinker himself as to those with whom he holds intimate relations. It is very seldom that I am called to a case of sickness where I can say that alcohol was the direct cause of the disease. Excluding cases of disease of the liver and kidneys and delirium tremens, it seems to me that habitual drinkers enjoy as good health and are as long lived as their more temperate brethren. I am very

seldom called to treat a case of consumption in an habitual drinker, and when we do find such, the disease seems to be brought on by the attendant vice, debauchery and poverty, rather than by the spirit-drinking itself. I do not find that spirit drinkers are more subject to inflammatory diseases.

"I have run over my day-book far enough to include the last one thousand cases for which I have prescribed, and among them all I find but eleven caused by alcohol. These eleven cases apply to seven individuals, as some of them applied for treatment at different periods. I have not been able to see that any of the children born in this town during the treatment of these one thousand cases have inherited any physical weakness or any disease from their parents being addicted to drink. This does not prove that the inordinate use of liquor is not at all injurious to offspring but it seems to show that individuals may at times even drink to excess and still the offspring not be injured by it. I know a number of men who have large families of healthy children and yet during all their married life have been hard drinkers. One reason for this may be that the children were begotten before the intemperate habits of the fathers had injured their systems. The effect of drunkenness of mothers upon their children would no doubt be worse. I know of but one such, and her children born since the habit became confirmed seem to be as sound as the others; but one case is not enough for proof. With few exceptions, the bad effect of spirit-drinking on the health of the people of this town, as they now drink, is an *indirect* one,—not so much affecting the drinker as his family,—subjecting them to hardships and mortifications, and by the well-known weakening process of these influences, rendering them more open to the inroads of disease. The practical conclusions which may be derived from the preceding observations are these: Moderate drinkers are not more subject to disease than the strictly temperate, if we except cirrhosis, and perhaps Bright's disease. Immoderate drinkers suffer from disease which is attributable to the collateral dissipation and exposure rather than to the spirit itself. The proportion of disease caused directly by drink to disease of all kinds is only one per cent. in my experience.

"The children of moderate drinkers are as perfect as those of the strictly temperate, both physically and intellectually. The children of fathers who were excessive drinkers, unless their fathers were intoxicated during the act of their generation, are apparently equally sound. The effect of alcohol on the physical economy, in not excessive quantities does not appear to be the direct cause of any of our prevailing diseases.

"That alcohol, used to excess, has an injurious effect on the moral and intellectual faculties, and that it leads to vice of all kinds, and is the cause of great domestic misery, and is thus the *indirect* cause of much physical suffering, there can be no doubt."

"This may be called a temperate community. The effect of the use of intoxicating liquors is by no means uniform. While I can recall many instances of ill-health from its use I can recollect very few where it manifestly shortened life. There have been many notable instances of great age in men who have always drank."

This closes the remarks on this subject by our correspondents in Massachusetts. We now present the correspondence from foreign countries.

The following letter was addressed by the Chairman of the State Board of Health to a great number of representatives of the United States Government in every part of the world :—

BOSTON, Feb. 23, 1870.

DEAR SIR :—The State Board of Health of Massachusetts is, by law, ordered to study the influence of intoxicating drinks on the health and prosperity, etc., of our people. It desires to get information from various countries in regard to the whole subject. I would therefore respectfully ask you to be kind enough to tell me :—

1st.—What are the chief intoxicating articles used in ———.

2d.—What amount of crime is produced by them; and their effects on the health and prosperity of the people.

Under the last question we would like to have your opinion (if you are willing to give it) as to the relative amount of intoxication in the country where you are now residing, and that seen in the United States.

We would like also any official statistics of the amount of intoxication and of crime resulting therefrom.

I remain, very respectfully yours,

HENRY I. BOWDITCH, M. D.,
Chairman of the State Board of Health of Massachusetts, (U. S. A.)

The following replies were received previous to January 1, 1871.

ANCONA, May 12, 1870.

DEAR SIR:—In answer to your communication dated the 23d February, ultimo, requesting me to give information respecting intoxicating drinks used in this country, and their influence on the people, though only a short time living here, I have been able to form the following ideas.

The Italian people as a body are not addicted to strong drinks. The principal drink of the country is wine, which is not intoxicating except when taken in great quantities. Spirits are only indulged in by the lower orders, and that in a very small proportion.

As for crime being committed under the influence of liquor, such a thing I may safely assert is unknown, and in case crime is committed under the influence of drink, in this country, it is taken as an extenuating circumstance in favor of the accused, a proceeding which is not always allowed in countries where intoxication is too prevalent.

The manufacturing and sales of liquors of all descriptions are perfectly free, government in no way interferes, nor is a license of any kind requisite for the sale or manufacturing of liquors.

You ask for a comparison of the amount of intoxication in this country and the United States. There is none; unfortunately the habit is too extended in the States to admit of a comparison with this country.

To sum up in a few words, intoxication as a general rule does not exist in this country, and in consequence the health and prosperity of the people are not in any way injured from the effects thereof.

I am, sir, very respectfully, your obedient servant,

ORRIN J. ROSE, *U. S. Consul.*

ATHENS, May 20, 1870.

SIR:—I have now the pleasure to reply to your circular letter of the 23d of February last, which, as I have before advised you, did not reach me until the 28th of April. You ask, 1st.—What are the chief intoxicating articles used in Greece?

The chief intoxicating article is wine; the native growth of the country. It is of pure grape juice, fermented naturally in barrels, without any artificial aid beyond the addition to the fresh must when put in the barrels, of about ten per cent. of common resin gathered from the bark of the pine-tree. This wine is very cheap, costing about thirty leptas an oke, or 15 leptas a bottle (say three cents). But little is exported, and that chiefly to Turkey and Russia. It may be said to be the universal drink of the people.

The average annual consumption in the city of Athens,—which contains a population of nearly 50,000 souls,—is about 1,900,000 okes of resined wine or 3,800,000 bottles. Of other spirits the estimate is 40,000 bottles. Rum and brandy are chiefly consumed by foreigners, of whom the greater part are sailors. The Greeks consume also, in small quantities, a spirit called raki, which is distilled from the lees of wine and from figs. Alcoholic drinks, spirits, rum, etc., are very deleterious in these warm climates. This fact, and the comparative high cost of these stimulants, limit their consumption. The light wine of the country on the contrary is generally regarded as harmless in its effects, if not positively wholesome, when drunk in moderation. A medical gentleman who has had large experience among the peasantry, informs me that "when not abused the tonic effect of the resined wine is rather beneficial than otherwise, its bitter pungency acting against the feverish influences of the summer miasmas." "In the village of Menidi near Athens," says my informant, "I know an old priest who, from the testimony of his neighbors, has consumed daily, ever since he was an adult, no less than two okes (four bottles) of the wine of the country at each of his meals, besides extra glasses at odd times, making in all about six okes or twelve bottles per day. This man is now ninety years old, is hale and strong and continues the same practice still."

2d.—What amount of crime is produced by them and their effects on the health and prosperity of the people?

It is very difficult to make an estimate of the amount of crime produced by intoxication, where no statistical information on the subject can be obtained; but from what has been already stated with regard to the character and use of the wine of Greece, you will infer that, as a general thing, crime cannot be attributed to this cause. So far as figures go it may be assumed that not more than one-sixteenth of the crime committed can be said to arise from intoxication. The Greeks are eminently a temperate people, and excepting on high feasts and holidays, a drunken man is rarely seen. My own observation is not a fair test as I am not frequently in quarters of the city where tavern brawls occur, yet it is worthy of remark that during two years' residence in Greece I have not seen as many as two Greeks in the condition called "dead drunk;" while it is a not uncommon sight to see sailors from foreign ships, reeling through the streets in various stages of intoxication. Drinking may occasion brawls and quarrels leading to high words and much volubility of speech,—for the Greeks are easily excited and much given to profuse language,—but I may say they seldom come to blows or to worse results, such as homicide, in consequence of excessive drink-

ing. This is to be attributed, chiefly perhaps, to the quality of the liquor drank, the wine of the country, as has been already stated, not having the same effect as spirits in this respect. The Greeks also are an orderly people, easily excited to anger it is true, which, however, is but momentary. The following return of deaths in the city of Athens (taken from the published register), during the last nine years, will show what an astonishingly small amount of deaths were due to strong drinks or delirium tremens. You will observe the proportion of foreigners is very great. These form scarcely one per cent. of the whole population, and the result is owing to the strong alcoholic drinks which they consume, while the Greeks, as a rule, confine themselves to the light wine of the country.

Registered Deaths in the City of Athens from the effects of Strong Drinks, "Encéphalopathie Crapuleuse" and "Delirium Tremens."

YEARS.	Natives.	Foreigners.	Total.
1860,	2	1	3
1861,	4	3	7
1862,	2	2	4
1863,	3	1	4
1864,	4	1	5
1865,	5	2	7
1866,	–	2	2
1867,	2	3	5
1868,	1	1	2
1869,	3	–	3
Total in a population of 50,000,	26	16	42

This statement may not be perfectly reliable owing to the fact that the certificate which must be given by the physician, before permission for burial can be obtained, is sometimes incorrect. It may happen, when the cause is habitual intoxication, that sensitive relatives induce the physician to call the disease by some other name. It is, however, well known that cases of delirium tremens are so very rare in Athens, as to excite the astonishment of the medical faculty who are unacquainted with the country.

3d.—What is the relative amount of intoxication in Greece and in the United States?

The relative amount of intoxication is very small indeed compared with that of most other countries. There are no statistics of intemperance in Greece, but from what has already been said you

will perceive that there is no comparison whatever in this respect with the intoxication and intemperance which prevail in the United States. Probably there is less intemperance in strong drinks here, than in any other part of the world, unless it be in Turkey and other Mussulman States.

I remain, sir, very respectfully, yours,

CHAS. K. TUCKERMAN.

BASLE, SWITZERLAND, 8th June, 1870.

DEAR SIR:—Your letter, making inquiries in regard to a subject to which I paid a great deal of attention, owing to its great vital importance in the United States, viz., the cause of temperance, I received in due time; the very wish to answer it fully, supported by documents of official statistics, caused my delay in writing to you sooner. Some two months ago I tried to get official information from the canton of Berne, where, owing to peculiar circumstances and laws, strong alcoholic liquors (schnapps) are manufactured and consumed, and where there is more immorality, crime and misery, it is said, than elsewhere in Switzerland; but failed to receive it up to this day.

Hence I answer the questions desired as best I can from my own observation and study.

Question 1st. What are the chief intoxicating articles used in Basle and vicinity?

Answer 1. This being a border state of France and Germany, where wine grows very abundantly, and costs retail from 10 to 25 cents a pint only, a great deal of wine is consumed even by poor persons and day-laborers (wood-cutters receive a bottle a day, servants from two to three bottles a week in each family). Beer is more of a luxury, and indulged in more freely by the middle and higher class, besides wine, every day, Sunday not excepted.

Question 2. What amount of crime is produced by these intoxicating drinks, etc.?

Basle is one of the most orderly, quiet and moral cities in Europe, I believe, and one of the richest of its size. In its vicinity there are immense silk ribbon factories. The higher and middle classes enjoy excellent health, and are prosperous.

The working classes, gaining small wages, consume proportionately a good deal of cheap wines as a substitute for more substantial food, such as meat, which factory people obtain, perhaps, only once or twice a week.

There is nothing like the same amount of intoxication witnessed here as in the United States, or other countries, where strong drinks are resorted to instead of wine or beer, and is always of less dangerous consequences, rarely leading to fighting, if ever to murder. Drinking is here connected with amusements, conversations, music, etc., indoors and outdoors; does not take place at bars, or secretly.

I am, very respectfully, your obedient servant,

J. C. ERNI, *United States Consul.*

LEGATION OF THE U. S. OF AMERICA IN SWITZERLAND.
BERNE, July 27th, 1870.

SIR:—Your circular letter, asking for information respecting the use and effects of intoxicating liquors in Switzerland, was received at this legation in April last. At the time, I was absent on leave from the State Department, and, on my return, about the 1st of June, I began making inquiries with the hope of collecting materials for a satisfactory reply to your questions. Considerable time has elapsed, and I regret to say that I have been able to obtain only very insufficient data for this letter. The evils consequent upon the intemperate use of intoxicating drinks have not attracted as much attention here as in the United States, perhaps for the reason that they have not been as seriously felt. Nevertheless, in some parts of Switzerland, and especially in the canton of Berne, intemperance prevails to such an extent, that recently, the cantonal legislation has sought to find measures for abating the evil.

The few statistics that I have been able to collect on the subject of the use of intoxicating drinks in Switzerland relate to the canton of Berne. That canton, however, includes a fifth part of the population of Switzerland, and it is the part of the country where, I am assured, the greatest amount proportionately of intemperance is found.

Your first question is: "What are the chief intoxicating drinks used?" These are wine, beer, and a species of brandy, or schnapps, distilled from potatoes, or from the pulp of grapes after the wine has been pressed out. French brandy, or kirschwasser, and various liquors imported from abroad, are also used to some extent, but very little by the mass of the people.

From official sources, I learn that the annual average importation of wine, beer and cider, in the canton of Berne, which contains a population, in round numbers, of 500,000, amounts to from eight to nine million maas (a Swiss maas is equivalent to one quart and three gills English measure). A large quantity of beer is manufactured in

the canton, but I have not been able to obtain the approximate amount. There is also manufactured from the vineyards of the canton about 1,750,000 maas of wine per annum. The annual importation of brandies and other spirituous liquors reaches about 700,000 maas, and about the same quantity of spirits, principally schnapps or potato brandy, is distilled annually in the canton. The greater part of all the above-mentioned drinks is consumed within the canton. But little is used except for drinking purposes. After making due allowance for the large consumption by travellers during the summer months, there still remains sufficient ground for the conclusion that the people of this part of Switzerland are not the most temperate people in the world.

Your second question is: "What amount of crime is produced by the use of intoxicating drinks, and their effects on the health and prosperity of the people?" Upon this subject, I sought for information from the Federal Bureau of Statistics, the chief of which, in reply to my application says: "We have no statistics on the subject. It may, however, be taken as granted that manslaughter and many acts of violence are frequently the result of intemperance. In cases of suicide, without considering other causes, many persons destroy themselves while in a state of intoxication. Of fifty-three suicides in the year 1868, eleven were intoxicated when they committed the act, or were notorious drunkards. In this canton, as elsewhere, one may see that the health and prosperity of those who have fallen into the habit of drunkenness are soon destroyed. Many families are ruined by this vice, and the children of drunkards tainted with hereditary disease."

I am told that the evil effects of intemperance here are chiefly visible in that class of the population addicted to the drinking of schnapps. This liquor is very cheap, and is the principal stimulant used by the poorer classes. Its manufacture and use have greatly increased of late years. It is drunk by the people of the rural districts, who either cannot afford or cannot obtain other liquors. Since Switzerland has been traversed by railroads, and is annually visited by multitudes of foreign travellers, the prices of all kinds of country produce have largely increased. The poor classes are not as well fed as formerly. The excellent milk of the country, formerly consumed by the people, is sold to the hotels, or manufactured into cheese for exportation. Many of the people live almost exclusively on potatoes, and a writer on the subject, whose essays have attracted a good deal of attention here, Mr. J. F. Schneeberger, of Berne, attributes the craving for alcoholic drinks, so much more noticeable now than formerly, to the lack of nutritious and proper food.

The general impression among those with whom I have conversed on this topic, is that the wines of the country are wholesome, and that the best method of introducing a temperance reform would be to bring wine or beer within the reach of the masses of the people, and discourage the use of stronger drinks. A very intelligent gentleman at Lucerne, a member of the cantonal legislature, with whom I conversed on this subject, said that some years since he had charge of enrolling the citizens of that canton subject to military service, and was struck with the difference between the people of certain valleys where wine is produced, and has always been a common beverage, and those of other districts where wine is not used, and schnapps is a common drink. The physical superiority of the former class was, according to his account, very striking, and the percentage of able-bodied men in the wine-producing districts very much the greater. He attributed the difference, in great part, if not to the positive virtues of wine as a beverage, at least to the positive evils produced by schnapps-drinking. Nevertheless, I suspect there were other causes. In the wine-producing districts there is usually a more generous soil, a milder climate, and more wealth among the people, who are consequently better housed and better fed, and might be expected, as a consequence, to exhibit, in their persons, the superiority which he remarked.

Last year two laws were enacted by the cantonal legislature of Berne, one having for its object the restriction of the use of distilled spirituous liquors, by increasing the tax on their manufacture and importation, and diminishing the taxes on wine and malt liquors. The other seeks to protect the public from adulterated liquors, provides for the inspection of distilleries, in order that only such apparatus shall be used as will produce an article as little injurious as possible, and affixes penalties for the violation of the law. A small tax still remains on imported wine and beer, and it is proposed that this shall be repealed in order to encourage the substitution of such beverages in place of stronger drinks.

Some efforts have been also made to counteract the immoderate use of strong liquors by the private and voluntary action of citizens. A temperance society was formed in the city of Berne several years ago. The members abstain from distilled liquors, and the society publishes prize essays for the instruction of the people in regard to the injurious effects of the immoderate use of intoxicating drinks.

You request me, finally, to give my opinion as to the relative amount of intoxication in this country and that seen in the United States. As my residence here has been comparatively brief, and my opportunities of seeing the common, every-day life of the people

somewhat limited, my opinion is liable to be erroneous. Judging from what I have seen, I must say it is my impression that, while the drinking of intoxicating liquors is much more general here than in the United States, there are fewer instances of actual inebriation than are witnessed there. As far as my observation has extended, it is not so common to see men reeling or noisy, under the influence of intoxicating drinks, upon the streets here, as in most parts of the United States with which I am familiar. In all the towns of Switzerland there is a market day once in each week. Almost the whole rural population of the vicinity seem to visit the city on that day. The cafés and restaurants are filled with people; there is apparently a great deal of drinking, and towards night, it is not unusual to see occasionally a person intoxicated. But I think that, under similar circumstances, much worse results would be witnessed in the United States than are seen here on such occasions. This is perhaps due in part to the fact that the people are in general of a less excitable organization than ours, and in part to the fact that the American custom of "treating" is but little practised here.

Regretting that I have not been able to collect more complete statistics upon the subject,

I remain, very respectfully, yours,

HORACE RUBLEE.

BERLIN, April 26th, 1870.

MY DEAR DR. BOWDITCH:—I have your letter of the 18th ult. The German intoxicating drinks are made of brandy, distilled from rye or from potatoes. The "schnapp" is but such brandy or spirit distilled with sugar. The beer used here cannot be called an intoxicating drink. I have no opportunity of observing the people in their places of indulgence, and cannot offer an opinion of my own on "the relative amount of intoxication in this country." Those of whom I inquire do not think the health and prosperity of the people greatly injured by the use of spirituous liquors.

I am ever, most truly yours,

GEO. BANCROFT.

BREMEN, May 7th, 1870.

SIR:—An answer to your *first* interrogatory contained in your favor of 23d Feb., will necessarily answer your second, namely "What are the chief intoxicating articles used in Bremen and

vicinity?" No intoxicating or alcoholic spirits are used in Bremen. Wines and beer are the favorite beverages, and are used and consumed in almost unlimited quantities. These are so cheap as to come within the means of all classes, more beer however being consumed by the middle and lower classes than any other. My observation has led me to conclude that no evil grows out of the use of these. For now, after quite a year's residence among the people here, I have yet to see the drunkenness and rioting which prevail in most of our American cities; the natural and consequent results from the sale and use of the intemperate spirituous liquors.

I am, very respectfully, yours,

R. M. HANSON, *U. S. Consul.*

U. S. LEGATION, CONSTANTINOPLE, May 27th, 1870.

SIR:—In reply to yours of February last I beg to say:

1. The intoxicating drinks most in use in Turkey are raki (popularly called *mastica*), and brandy. The former is simply rum flavored with mastic, to give it an aromatic taste. The rum was for the most part imported from New England, but this importation has now almost ceased, being undersold by the rum of Austria and France. Brandy and Cognac are imported from France England.

2. The use of intoxicating drinks is confined to the Christian populations, and of these the Greeks are the most addicted to them. Even among those who indulge in spirituous liquors intoxication is very rare, and habitual drunkenness is comparatively unknown. Sobriety is the rule and intemperance the exception. Drunken men are seldom seen in the streets of this city, and when a case occurs, it is generally a foreign sailor. The English sailors, I am sorry to say, are conspicuous for drunken habits on shore. Their intemperance is a fruitful source of outrage and crime.

The Mohammedans by religion and habit are temperate, and they regard drunkenness with aversion, as degrading to human nature. They abstain as a rule, from the use of intoxicating drinks. None are sold in their *cafés*, and by imperial authority they are not allowed to be offered for sale in the vicinity of the Imperial Palaces, government offices, kiosks frequented by the Sultan, and the military barracks. At the review held last year on the plain of Hunkiar Iskelepi, of 30,000 Turkish troops before the Sultan, the Empress Eugenie and the Emperor of Austria, and in the presence of 50,000 spectators, not a drop of liquor was sold in the *cafés* and

refreshment tents. Not a single drunken man marred the order and decency of the scene. It has never been my lot to witness a more respectable and decorously behaved multitude. The same good order prevails at all Turkish festivals.

I regret to be obliged to admit that Mussulmen exhibit a vast superiority to Christians in their abstinence from intoxicating drinks.

3. I have no means of furnishing you reliable data as to the amount of crime produced in Turkey by intoxicating drinks, as no statistics are collated here, except a few on commercial matters. I am safe in saying, however, that it is inconsiderable. The habitual use of ardent spirits in this country leads to gastric fevers, to apoplexy, paralysis, and a rapid decay of physical and mental health. He who is careful of his health abstains from them altogether, total abstinence being the wisest and safest rule.

I think it proper to add that wines, native and foreign, are cheap and in general consumption among Christians. When not adulterated by drugs, and drank moderately at meals as beverages, they are regarded by physicians as wholesome in their influence.

I am sir, very respectfully, your obedient servant,

E. Joy Morris.

Constantinople, Turkey, July 12th, 1870.

Sir:—Your letter of inquiry as to the varieties of wines or spirituous liquors used in Greece, and their apparent effect upon the character and behavior of the people, was received two months since.

Immediately after I commenced a somewhat extended tour in the Peloponnesus and islands, and found neither opportunity nor leisure to furnish the information you desired.

And now I can only give my own impressions, formed after such inquiries as I have been able to make, and subject to mistake. Should I be able hereafter to get at any more definite facts I will make it a duty to communicate them.

First,—the kind of intoxicating liquors used in Greece is almost exclusively wine.

There are manufactories of rakée at Calamas, and at other places in the Peloponnesus, but usually the people prefer to drink the wine, and only take the rakée when much exhausted, as a stimulant.

I have never seen in an eight months' residence in Greece, a man make himself drunk with rakée. This rakée, it should be said,

is exceedingly strong. As to the Greek wines, probably they are purer than those of any other country in Europe.

When one becomes habituated to the resinated wine, which is the common drink—the poorer people liking no other so well—he discerns the purity of the wine from all other admixture, and under the cloak of the resin can distinguish easily the different grapes from which different wines have been made.

The proportion of resin varies from ½ of 1 per cent. to 5 per cent. Its addition is considered to make the wine more healthy, to facilitate digestion, and to counteract any ill effects which the lime-water of the country may have.

Passing the other day, from Athens to Smyrna, as soon as I tasted the light wine of that country, I could perceive the spirit in it to a degree which I had not known in Greece. There is perhaps no country in the world where wines are cheaper than in Greece. New wine is sold in Arabia in the fall for four or five cents per gallon. Before the grape disease of '53, '54, '55, '56, &c., there were times when it was sold for one or two cents. On the high plain of Arcadia, and in the mild valley of Acarnania—in fact in all of western Hellas—wine with bread and olives and oil makes a chief article of food; babies, even, drink it.

It is the most abundant of all products, and the easiest procured. In Acarnania you will often find wine when you would hardly find bread.

I should say that from the purity of the wine used, that an excess of it caused little injury to the health, and ready as the Greeks are to quarrel, I am inclined to think that comparatively few quarrels take their origin in drink.

I believe that ten per cent. would be much above the proportion of crimes of all sorts, directly or remotely connected with the use of wine or spirituous liquors. During my residence in Greece, and my travels in it, I have scarcely seen half a dozen drunken men.

I am, sir, with great respect, obediently yours,

ROBERT P. KEEF,
U. S. Consul Piræus, Greece.

N. B.—The rakée in Greece is usually made from figs.

CADIZ, April 20, 1870.

DEAR SIR:—Your favor of the 23d of February last is received, and I will try to comply with your request as far as I know.

The chief intoxicating articles used in Cadiz and vicinity are:

cherry wine, burgundy and aguardiente; this last is the whiskey of Spain.

No crime whatever is committed on account of drunkenness; the Spaniards do not generally drink, and the only cases of intoxication belong to foreigners coming here as sailors, and to them alone is attributed all disturbance of peace. As far as I have been able to see, the intoxication leads those foreigners to quarrels and fighting, but nothing more, and permit me to inform you, that in my opinion either of the above liquids have on the inhabitants of this part of the country the effect to make them indolent; this, however, may come on account of the climate. No Spaniards carry on here any business of any importance, but, however, they are all in an easy social position. The people living in the country drink a good deal of aguardiente, which is the most dangerous of the above liquids mentioned. This aguardiente is of a white color, but not exactly, having a yellowish appearance, and its taste is very much like annisette. I have remarked often, as soon as these people have drunk sufficiently of this liquid, they were led to cheerfulness, and after to a complete state of indolence; but I never saw one in a state of intoxication. It is also the favorite drink of our sailors coming here. Now there are many robberies committed in the mountains, but the robberies and crimes which may be committed by brigands are committed in cool blood, as never or very seldom have they been found with any intoxicating liquid even in their camp. The health is generally very good, and in a population of 60 to 70,000 inhabitants, the daily average of deaths is three to four per day. Cherry wine and burgundy are the only wines shipped to the United States, of which the greatest part goes to New York, Philadelphia, New Orleans and Boston.

Very respectfully, yours,

A. N. DUFFIE, *United States Consul.*

UNITED STATES LEGATION, COPENHAGEN,
2d May, 1870.

DEAR SIR:—On the receipt of your favor of the 23d February only a few days ago, I sought an interview with Mr. C. N. David, Chief of the Bureau of Statistics in Denmark, and one of the best authorities upon all such subjects in Europe.

I left with him a copy of your letter, and now enclose you his letter to me of the 30th April. As his statistics cover the period since the severance of the Duchies of Holstein and Schleswig, they may be taken as applicable to what is called "Denmark proper," and therefore, a population, I believe, of about 1,600,000.

In conversation with me, Mr. David deemed it extremely difficult, indeed impossible, to say what proportion of crime is caused by the use of intoxicating drinks. He only speaks certainly and confidently of suicide; but as to the general list of crimes, I take his impression to be that intoxication does not have here so marked an effect as it is generally supposed to have in the United States. Still he is very cautious to say that accuracy cannot even be approached on the subject.

He informs me that the quantity distilled, and the average consumption per head, are much greater than twenty or thirty years ago; but, with his accustomed caution, he adds that in making this statement, he speaks from official figures, and that the law affecting the manufacture being now stricter and better administered, he cannot say how far the estimate would be affected by former clandestine distillation, which is now very rare.

He assures me that while the average consumption has thus seemed to increase largely, the number of cases of manifest and public intoxication has greatly decreased; which he attributes partly to improved manners, morals and education, but mainly to improvement in the quantity and quality of food the people use, believing that well-fed people can support more alcoholic stimulus than poorly fed people.

He thinks the tendency and habit of intoxication somewhat greater in the cities than in the rural and agricultural districts.

In reference to retail sale in small quantities, there are two sorts of license: one to sell, with permission to use on the premises; and the other to sell, without such permission; and he thinks the permission to remain and use the liquor on the premises much more injurious to the purchasers. Practically there is no difficulty or impediment whatever in the way of those who want it, and are able to pay for it. He did not discuss prohibition at any length, but does not seem to regard it as an efficient remedy, and intimated an opinion that it would only increase the clandestine manufacture, sale and use.

Beer is very largely used here, as elsewhere in Northern Europe, but is not deemed an intoxicating beverage. It is said to be not nearly as strong as English beer, and I think is not so strong as that made in the United States.

The strong drink, or "brandy," is mainly distilled from barley; potatoes were formerly much used, but have been very little used since the appearance of the potato disease some years ago.

I cannot give any definite or intelligent opinion of the relative amount of intoxication here and in the United States, especially in

the N. E. States, where I have seen so little of the people. There is certainly much less visible and outbreaking intoxication here than in those parts of the United States where my opportunity for observation has been best; but on the other hand, I must admit my surprise at the large aggregate and average consumption shown by Mr. David's figures. The people of this country are remarkably quiet, steady, peaceful, plodding and law-abiding; given to much out-door and open-air congregation and amusement, but always with an order and decorum that have commanded my admiration. It is possible that owing to these manners, and to the climate, the same amount of intoxication would not be so much seen and heard here as where I live. Very respectfully, your obedient servant,

GEO. H. YEAMAN.

COPENHAGEN, 30th April, 1870.

By returning the included letter of Mr. Bowditch of Massachusetts, I have the honor to communicate to your Excellency a notice concerning the produce of the home-distilleries in Denmark in the years $18\frac{64}{65}$–$18\frac{68}{69}$, and the importation of brandy, or a kind of rum, from abroad, during the same five years.

YEARS.	Home Distilleries.	Exported.
1864-5,	34,753,000 pots.	1,498,000 pots.
1865-6,	35,794,000 "	735,000 "
1866-7,	33,071,000 "	1,045,000 "
1867-8,	31,614,000 "	1,141,000 "
1868-9,	32,632,000 "	864,000 "

Five pots are about 1 gallon. The home distilleries produced on an average 33,570,000 pots, or about 6,700,000 gallons, of which 1,257,000 pots (250,000 gallons) yearly are exported.

YEARS.	Importation of Brandy.	Re-exportation.
1864-5,	1,500,000 pots.	249,000 pots.
1865-6,	2,403,000 "	596,000 "
1866-7,	2,137,000 "	453,000 "
1867-8,	1,875,000 "	481,000 "
1868-9,	2,486,000 "	837,000 "

On an average, 2,080,000 pots of foreign brandy were imported (416,000 gallons), of which about 520,000 pots (104,000 gallons) were re-exported.

No doubt that this large consumption of intoxicating drinks in Denmark, as in other countries, has a very lamentable influence upon the moral and physical constitution of the people, though the state of the climate and the nourishment of the people, in accordance to its better condition and common welfare, to a certain degree, can mitigate this obnoxious influence; but it is in my opinion impossible definitely to ascertain the amount of crime and the deplorable effects on the health and prosperity of the people, which can be ascribed to the consumption of intoxicating drinks.

The sole fact, which I think in this respect can be quoted, is that among 100 self-murderers—and the number of self-murders is very large in Denmark,—according to the inquests of the coroners, 26.5 are declared "drunkards," or "fallen into the abuse of drinking," say for men 32.6, and for women, 8.7.

Your Excellency, most obedient,

C. N. DAVID.

To His Excellency, G.H. YEAMAN, *Minister of the United States.*

COPENHAGEN, 4th May, 1870.

DEAR SIR:—Since my letter of the 2d inst., it has occurred to me that the information was not so full upon the subject of *health* as you might have expected, but I do not find that I can make it much more explicit.

I have to-day sought an interview with Professor E. Fenger, formerly at once a leading medical practitioner in this city, a medical teacher in the university and in charge of one of the principal hospitals; and who has since devoted himself very much to all sorts of statistics, and is now acting as president of the principal life assurance company of this kingdom.

He agrees with Mr. David that there are very few reliable statistics on the subject, except in relation to suicide, which having been unusually and painfully frequent here, led to inquiries as to the causes.

He thinks that intoxication or excessive drinking often superinduces chronic diseases of the liver and kidneys, and at other times leads to dropsy and diseases of the bowels, but he does not think any accurate figures or proportions can be given.

He regards the consumption here as "very large," and when I referred to the general opinion that it is much larger in Sweden and Norway than here, he replied that he believed the consumption

here is larger, but that individual cases of drunkenness and intoxication are much rarer here.

In the country agricultural laborers generally eat five times a day, and the custom is that the employer must furnish a glass or two of brandy three times a day. Many of the country people mix it with their tea and coffee, especially with tea. On convivial occasions punch is used, made of West India rum, lemons and sugar, but the brandy I have spoken of is the common daily drink. Literally translated, its name is "corn brandy;" is very cheap, and is not so strong as Swedish "banes" or American whiskey. It is so cheap, the professor says, that a strong man can get drunk on twopence.

The well-to-do classes here use freely the wines from Central and Southern Europe, but I have never heard an intimation that anybody used them injuriously.

Professor Fenger agrees with Mr. David that while the consumption of brandy has increased, the proportion of visible cases of intoxication has very greatly decreased; that the people are well fed, and that that is one reason why they can drink more.

You see from these statements the extreme difficulty of estimating the effect either upon health or "prosperity." Here is a people evidently more prosperous than formerly, evidently using more brandy than formerly and evidently less given to intoxication than formerly. Of course, all will admit that the diminution of drunkenness is an increase of prosperity, but I have found nobody to claim that the increase in the quantity of brandy used has increased the prosperity of the people. The people here appear so very sober, that I have been simply astonished to find how much brandy they really use.

Professor Fenger refers me to an elaborate and scientific work, *Alcoholismus*, by Dr. Huss of Sweden, printed in Swedish, and, he thinks, translated into German. If you wish, I shall try to procure it for you.

The only figures to which he can at present refer me are the following in relation to insanity, taken from the report of the lunatic asylum for the city of Copenhagen:—

YEARS.	New Cases Admitted.	Attributed to Intoxication.
1864,	116	12
1865,	119	14
1866,	152	23
1867,	120	11

Regretting my inability to furnish you with fuller and more detailed information, I remain,

Very respectfully, your obedient servant,

GEO. H. YEAMAN.

COPENHAGEN, 5th May, 1870.

DEAR SIR:—I should perhaps make a correction in that part of my letter of yesterday relating to the lunatic asylum for Copenhagen. I used the expression "attributed to intoxication." In the printed tables the word "drik"—drink—only is used; and I cannot tell whether those who made the estimates and framed the tables of causes used this word to express the habit of drinking or the habit of intoxication. But as it is quite possible for a man habitually to drink too much without ever getting really drunk, they may have had in view only the habit of drinking too much.

I would add that the population of the city is about 170,000, and that but few cases are admitted into the asylum from other provinces.

Very respectfully, your obedient servant,

GEO. H. YEAMAN.

P. S.—In regard to the increased prosperity of the Danish people of which I have spoken, and of which there seems to be no doubt, it ought to be mentioned that several important facts have concurred with it, and, no doubt, have contributed to it.

Among these I would now only mention the improved condition of land tenure and distribution, as well as improved agriculture, greatly enlarged political franchise and improved educational facilities. There is, perhaps, no country in Europe, except Prussia, where the average standard of education and intelligence is so high as in Denmark—very nearly approaching in these two countries the standard attained in those States of the Union where the system of public common schools has been long established. I have said that agricultural laborers eat five times a day. The statement is true of the entire laboring population, except, perhaps, the household domestics of the upper classes. Well-to-do families have generally four meals, or two meals and two refreshments, which may be called in English, coffee, breakfast or lunch, dinner and tea. Even the inmates of the "poorhouse" eat five times a day, but are not furnished with the "brandy." G. H. Y.

UNITED STATES CONSULAR AGENCY,
COLOGNE, 8th July, 1870.

DEAR SIR:—Your letter of the 23d February last has been duly received, and in reply I beg to express to you my sincerest regret that I have not succeeded in answering your questions in the way I wished to be able to do, although I endeavored to get information everywhere.

The chief intoxicating drinks used in this country are beer and brandy, and in the vine countries the most inferior descriptions of wine; however, it is particularly the brandy which produces the most disadvantageous influence on the health and prosperity of the people. From the inclosed communications, which the Board of Health of the Nether-Rhine at Dusseldorf has kindly given me on my application, you will learn that there are no official statistics existing in this country with regard to the amount of intoxication and of crime resulting therefrom, but it may be taken for granted that nearly seventy-five per cent. of the number of criminals have committed their crimes by the influence of intoxicating drinks.

I may still add that a correspondence has taken place on the matter between the said Board of Health and Dr. Varrentrapp of Frankfort-on-the-Main, who is an experienced man in the branch of prison matters, and that he was likewise unable to answer fully your questions, but being about to send some books to Boston he promised to add some pamphlets referring to the matter for you, which I have every reason to believe he will have done.

I remain, very respectfully, yours,

GEORGE HÖLSCHER, *U. S. Consular Agent.*

Mr. Hölscher subsequently forwarded the following documents:—

(TRANSLATIONS.)

SIR:—Allow me to answer your very kind letter of the 20th of this month. The question raised in the royal ministry in regard to statistics concerning "what influence the use of intoxicating drinks had on the number of committed crimes," was not taken into consideration particularly, and other official statistical statements for judging this question are unknown.

The Chief Procurator, (Signed,) BÖLLING.

COLOGNE, April 27, 1870.

COLOGNE, May 13, 1870.

SIR:—I have the honor to answer your very kind letter of the 6th, and regret very much that I am unable to answer your inquiry in regard to the statistical information of "what influence the use

toxicating liquor has on crimes," and can furnish you no mate-
. It is generally known what a powerful influence it exercises,
for this in particular all institutions for correction are in the
position. To prove facts in different ways with the multitude
xamples there are, so far as I know, no statistical proofs, and if
are such in existence, they are to be regarded only as not
approaching the truth; the difficulty in presenting them does
need any further explanation. So far as regards the institutions
nishment, I am unable to give you any statistical information,
gh for the last twenty years I have spent my time in works of
stics, particularly in relation to improvement in institutions of
ns very minutely. *The Director*, VON GOTZEN.

the Superintendent of the Society of Public Health, Dr. Lent.

COLOGNE.

R. LENT:—You honor me with your letter of May 17th, refer-
to the letter of our Agent, Pastor Schiffer, of May 7th. Allow
o answer.

l the gentlemen connected with the Institutions of Punishment,
Directors, Inspectors of our provinces, to whom we addressed
lves—namely, the President of the State Commission of
th of the United Provinces, for the purpose of finding out
influence the use of intoxicating liquor has in the amount of
es in this country, answer as follows:

oper statistical material was not communicated, and is very
ult according to the nature of the matter, because in many
utions the personal acts of the imprisoned are not brought
ard, and the experience of a few does not give sufficient stand-
to make statistical results.

e have the honor to collect the information of single institu-
.

e Director of the Institution for Correction at Herfordt, com-
cates that in the House of Correction, in the Province of
phalia, where there are the most Protestant prisoners, minute
tical notices are not extant. It would come very near the
to say, that seventy-five per cent. of the crimes of prisoners,
cularly murder, manslaughter, resistance against authority,
nals against morality, assault and battery, thieving, house-
ing, and even a higher percentage of some of these crimes can
aced to intoxicating drink. In Munster a great penitentiary,
e there are from 600 to 700 Catholic prisoners, only since
uary when the new Director came, have they begun to collect
notes. For this an answer is not possible.

The Director of the Central Institution at Hamm, A. L., where there are from 400 to 500 prisoners, communicates the fact that two-fifths of the cases of assault and battery were due to the influence of liquor. The Inspector of the prison on the Spaumberg, near Bielefeld, where the prisoners aggregate 70 or 80 per day from the district Minten, says one-third are punished for stealing, one-sixth for heavy assault and battery, one-sixth vagabonds, one-sixth for loafing and insulting, and the last one-sixth for depredations. With the exception of youthful thieves, the use of intoxicating drink was the direct or indirect cause of nearly all this crime. The Director of the House of Correction at Benninghausen, answers that he has no statistical material; still the report of the Director of Brauweiler and our own experience show, that without exception beggars and vagabonds come in this way.

We observe still, that besides the above named Institutions, there are a great number of prisoners whose time is three months.

Regarding the Rhenish Provinces, we did not receive any information from the Director at Werden, he having been there only two months.

The Superintendents at Dusseldorf, Cleve, Bonn, and Coblenz, regret not to be able to give any satisfaction.

The Director of the Cologne Institution answered that he sent you his report as asked. The Director of the House of Arrest, in Aachon, estimates according to his experience, the number of persons made criminals in consequence of intoxicating liquor, at 75 per cent.

From the report of the Inspector of the House of Arrest, whose daily statements are about 200 prisoners, it is found that 75 per cent. of the imprisoned became criminals by brandy. Not only grown persons, but youths and even the female sex, are not excluded from it. Young persons from seventeen to eighteen years of age, and old men after being dismissed, are brought in again for new crimes, entirely drunk on the next day.

On dismissal the prisoners are *saluted*, partly by their parents, partly by their male and female friends, with a bottle of schnapps at the very gate of the Institution. Of those who have been deprived of their liberty, and present themselves for punishment, hardly one is sober, and almost daily, because entirely drunk, they are sent off again. The excuse, "Yes, he is a very good fellow, but he likes to drink," parents do not hesitate to say of their children of tender years.

The Director of the Institution for Correction at Tsier, where prisoners are retained one-quarter in the House of Correction, and

ee-quarters in jails, reports that of 1,091 prisoners for 1869, ught in to undergo punishment, 380 were punished for assault battery, indecent exposure, destroying property, and as nuisan- in the street. Beer and brandy are not much drank; on the trary *very* much cheap wine, or cider called "tietz" is used, as much intoxicating as any other intoxicating drink.

Among the 70 prisoners in the House of Correction, there are nd 51 criminals among old men, seventy to eighty years of age, ished for lewdness, many of them with small children. Even e the excessive use of intoxicating liquor can, with certainty, be arded as the cause of this crime.

IR:—In response to your kind letter of the 14th of this month, ave the honor to say, that I am not in the position to furnish with statistical notices on the question of "what influence does use of intoxicating drinks have in the number of crimes in this trict?" There is no doubt, that the excessive use of spirituous nks, particularly schnapps, in one word, drunkenness is the cause the imprisonment of the greatest part of the inhabitants of the titutions for males in this place.

A great number have by the excessive use of schnapps, been ken down morally, so far that they ignore entirely the duty im- ed by the Creator on every man, to earn his living by work, and y prefer rather to be beggars and vagabonds.

Another part, among whom I count mechanics, are ruined in sequence of this vice, so far that they are no longer able to fulfil moderate expectations of the trade. Such individuals are found ularly on the travel, but they do not have the will to accept rk, but go about begging, to satisfy their appetite for drink. ey succumb to the law.

Again, there are others, who by excessive use of schnapps, are able to perform even the lightest kind of work. Homeless, y are loafing about, and at last for want of support they are im- soned and punished.

To this class also belong fathers of families, who do not use ir daily wages for the support of their families, but spend them schnapps, and let their families suffer. According to law they subjects for imprisonment, and liable to be sentenced.

I repeat that schnapps in most cases is the cause of vagabonds ggars, and being without homes. How much the vice of drunk- ess can captivate a man, in other words stick to him, can be proved the fact, that most persons imprisoned here, have nothing else to as soon as they are set free, than to quickly find a *rum-hole*, and

with a real rapacity fall upon this devilish drink, after having been deprived for months, and even years.

I am convinced that a great number of prisoners, if they have opportunity, would rather stretch out their hands for a glass of schnapps than a piece of coal.

The above sad descriptions are not all based on exaggerations, but they rest on my many years' experience, and are an imperfect picture of the naked reality.

With high esteem, yours,

MÜLLER, *Director.*

BRAUWEILER, May 25th, 1870.

We declare ourselves ready to contribute in the future, as far as possible further explanations on this point of law, and of society, which makes our work so difficult.

We sign with the highest esteem. The Committee of the Society of Prisons of Rhenish Westphalia,

(Signed,) SCHEFFER.

DUSSELDORF, June 23d, 1870.

DUBLIN, May 6, 1870.

DEAR DR. BOWDITCH:—Your letter dated March 8, was duly received, and the very day it reached me I placed your questions in the hands of Mr. Russell, the agent of the Irish Permissive Bill Association, a man of great zeal and ability, and who is, I think, better qualified to answer your inquiries than any one else I know of. He travels extensively through the country, and is a person of great intelligence. He promised, and I believe intended to reply very soon; but I suppose his numerous engagements prevented his doing so. I will keep him in mind, and will let you know as soon as I possibly can.

Yours, with great regard,

RICHARD D. WEBB.

The following is the reply of Mr. Russell, since received:—

Query No. 1.—"What are the chief intoxicating articles used in Ireland?" Amongst the poor and middle classes, whiskey and porter. Amongst the rich, wines and brandy.

It has been found of recent years that ether has been used to a very considerable extent in several northern towns, notably in Draperstown and Maghera.

Query No. 2.—"What amount of crime is produced by them, and their effects on health and prosperity of the people?"

68, the last year for which I have "judicial statistics," men and women, were charged before the magistrates out the country on the ground of drunkenness, Dublin, population of 250,000, contributing 16,000.

the exception of the class of crime known as agrarian, near le crime of Ireland is due to drink.

TESTIMONIES ON THIS HEAD.

ases which will come before you originated entirely in the indulgence ating drinks. If our poor people in this country were free from this a single case would come before you at these assizes. We have in ess crime than in other countries; but it would be still further d if the indulgence in intoxicating drink was completely stopped, or r less practised than at present."—*Mr. Justice O'Hagan (now Lord-r) to grand jury at Monaghan*, 1868.

experience leads us to the conclusion that all the crimes we meet ircuit are more or less, directly or indirectly, caused by drunken-*Mr. Justice Lanson to grand jury at Armagh*, 1869.

e been thirty years chairman of quarter sessions in several counties . I have, perhaps, presided at more criminal trials than most men d I can truly say that I have had scarcely a case before me with to the class of offences known as against the person that was not the ce of drunkenness."—*Mr. M. O'Shaughnessy, Q. C., Chairman of essions, County Clare.*

ffects of drinking upon the prosperity of the people may be by the following statistics. The consumption of drink has creased since 1865, but the figures given are all under the her than above :—

Consumption and Cost of Liquor in Ireland, 1865.

ade spirits retained for consumption	(gallons),	5,036,814
and Colonial, ...	"	325,995
f all sorts, ...	"	1,208,233
. . . . .	(barrels),	1,538,209

Cost.

ade spirits, at 16*s.* per gallon, . . .	£4,029,451
and Colonial, at 20*s.* per gallon, . . .	325,995
t 15*s.* per gallon, ...	906,174
37*s.* per barrel, ...	2,840,137
	£8,102,757

xpenditure, in proportion to the population, is greatly below ither England or Scotland, but still it is enormous, being

at the rate of £1 9*s.* for each individual, or nearly £7 10*s.* for each family in the country.

It is £2,043,477 more than the value of the entire imports into Ireland, that being in 1865	£6,059,280
It is £1,318,217 more than the total revenue of Ireland, that being in 1865	6,784,540
It is nearly five times as much as the total receipts of the railroads in Ireland, that being in 1865 . .	1,737,061
It is nearly eight times as much as the whole county cess of Ireland, that being in 1865	1,061,399
It is more than ten times as great as the entire sum voted by parliament for primary education, that being in 1865	336,770

And were these added together, the whole receipt of the railways, county cess, entire sums expended on poor relief and primary education, it would not amount to one-half of the sum expended on intoxicating liquors.

Sum expended on intoxicating liquors, . . .		£8,102,757
Receipts of railroads, ...	£1,737,061	
Grand Jury cess, ...	1,061,399	
Poor rate, ...	731,851	
Education grant, ...	326,770	
		3,857,081
Balance, ...		£4,545,676

The poverty of the country is thus intensified by the drinking habits of the people.

I am not in a position to say what the results are upon the health of the people generally. But medical men are clear in their testimony that a very large percentage of the disease brought under their notice arises from drink. T. W. Russell.

Elsinore, Denmark, 3d May, 1870.

Sir:—I have the honor to acknowledge the receipt of your circular letter of the 23d February, making inquiries as to the influence of intoxicating drinks on the health and prosperity of the people of this country; and in reply to the several questions contained therein, I now beg to inform you.

1st. That the principal intoxicating drinks used in this country by the middle and lower classes of the population are beer and spirits

istilled from barley and rye, under the denomination of corn bran-y. Under this head, I give you the statistics of the quantities nnually consumed, as far as I have been enabled to collect them. hey are as follows :—

f home manufactured spirits (corn brandy), about 6,500,000 gallons.
Imported spirits, ... 450,000 "
Wines, ... 400,000 "

Of the exact quantity of beer consumed, I am sorry to say I have ot been able to obtain any correct and positive returns, no duties r excise being levied on this article. From the information which, owever, I have been able to get from intelligent brewers and thers, I think it can safely be put down as at least twenty gallons nnually for each head of the population. The principal brewer in his town has given me the amount brewed here and sold for con-umption by the population of this town and the neighboring land districts; to say a population of about 12,000, and the quantity of eer sold about 275,000 gallons, and this would appear to confirm he calculation above mentioned of twenty gallons per head.

It must, at the same time, be borne in mind that the great part f the beer consumed is very thin and weak, as the prices will show, eer being sold here at prices varying from one to four cents per ttle.

Denmark has a population of about 1,600,000 inhabitants, which ill give a consumption of about four and a half gallons of wines d spirits per head, and this added to the amount of beer con-med, will, in my opinion, give a heavy average amount of con-mption as compared with other countries.

Strange to say, this large annual consumption does not seem to ve any injurious effects on the health of the people. The Danes e a remarkably strong and hardy race, and the average duration f life will bear a favorable comparison with any country in Europe nd is certainly superior to that of the United States. There is uch less energy of character to be observed amongst the people enerally here as compared with us, but whether this is to be attrib-uted to effect of climate, or to the too great use of intoxicating drinks, I am not in a position to say. During my short stay in this country, I have been much struck with the general sluggishness and small amount of work obtained out of the laboring classes as compared with the same classes in the States, and I have been a fre-quent witness to the strange sights of ship carpenters, masons, house carpenters and other trades, knocking off in their work to take a drink out of their bottles of beer or spirits.

Cognizant as I have been of the large quantities of these drinks generally consumed here, I have been considerably surprised at the exceptional cases of intoxicated people I have seen, either in the streets of this town or in my frequent visits to Copenhagen, the capital of the country, and I have no hesitation in saying that I have witnessed a much greater amount of intoxication in the towns in the United States than I have in this country.

2d. As regards the amount of crime produced by the use of these drinks, I cannot find any statistical tables to supply me with such information, but I am told by the police magistrate of this town, that in his jurisdiction no cases of murder, homicide, or theft, that have ever been brought before him, could be traced to the influence of drink, and that even arrests for street disorders are very rare amongst the inhabitants, and chiefly confined to the foreign seamen frequenting the place.

As far as my own personal observations go, the Danes seem to be a remarkably peaceable and orderly people. There is no rowdyism to be seen in the towns, and the very few intoxicated people I have seen in the streets, seem to stagger along without making any attempt to molest the passers by. The very low prices of these articles in this country, say ten cents for a bottle of corn brandy, and one to two cents for a bottle of ordinary beer, accounts, doubtless, in a great measure for the small amount of poverty which might be expected from so large a consumption of intoxicating drinks.

I have the honor to be, your most obedient servant,

C. C. SHEATS, *U. S. Consul.*

CONSULATE-GENERAL OF THE UNITED STATES,
FRANKFORT-ON-THE-MAIN, May 20, 1870.

DEAR SIR:—I have the honor to acknowledge the receipt of your circular, dated February 23d, 1870, and now transmit a reply to the same.

I incorporate herewith, as a part of this reply, a communication upon the subject made to me by the vice-consul, at this consulate, who has resided in this vicinity nearly the whole of a long life, and who is very competent in every respect, being himself a German, to give an accurate history of the uses of drinks in Germany.

To your first inquiry: What are the chief intoxicating articles used in Frankfort and vicinity?

I answer,—wines, beer and cider. French brandies are used in very small quantities by some, but very rarely by native Germans. The qualities of wines used depend upon the rank, condition, means

and associations of the individual. The wealthiest classes use champagne in free quantities, sparkling Hock, the best Rhine wines, and the purest and richest Bordeaux wines. The middle classes use champagne and hock in small quantities, but generally drink light and cheap pure Rhine wines, and Bordeaux wines of a cheaper kind, and certain kinds of beer called "vien" and "Bairisch" beer. The poorer classes use a brandy made of potatoes, cheap and poor beer, costing about one-half as much as the beer known as "vien" or "Bairisch," and cider, all of which is drank very largely. Water is not much drank. To your second inquiry, "What amount of crime is produced by them? and their effects on health and prosperity of the people," I answer, that it is impossible to find any statistics of crime which go so far as to inform of the causes of crimes. Observation alone can enable any one to form an opinion of the proportion of crimes caused by the use of intoxicating drinks. I believe that but very little crime is committed in this part of Germany. There are few high crimes committed. An ordinary assault is very rare. Larceny is the most common offence. The surveillance of the police is searching and ever alert. People are restrained from the commission of crime by the fear of punishment, which is most certain to follow. Intoxication is very rare. During a residence of a year in Frankfort I have not seen more than five persons intoxicated. All of them were of the lowest order of laborers, and still not quarrelsome, but very hilarious and good-natured. I have seen no one stupidly drunk or as we say "dead drunk." I have seen no well-dressed person, nor any person claiming to be of a respectable condition or having any business or calling, whom I supposed to be under the influence of intoxicating liquor, in a noticeable degree.

Either from climate, temperament, mode of life, habits, or from necessity, the German seems to be of a quiet character. I can hardly say contented, nor happy, nor much more of a prosperous character. Originally, from the necessity of a common defence, they congregated into small, compact and ill-ventilated and badly planned and constructed villages; and now from choice they continue in the same old villages, instead of scattering along the lines of the highways; and from them every morning sally out the men and women (and more women than men) to labor in the adjoining fields, or to work in the near cities, spending the day upon a pittance of bread, and return at night into their village at dark to enjoy the only meal of the day, and to spend their evenings in smoking and drinking their beer in crowds or cliques.

The lot of the German laborer seems to be hard. He travels

miles to his daily work, he works hard, he fares most scantily, he receives very small pay for his labor, he returns at night tired, worn, weary, and in his house he finds no comfort, and yet he does not resort to intoxication for a relief from pressing sorrow or despair. He rises again, eager to go through the same routine. He commits no crime. He thinks of no evil. He expects to labor, and looks to nothing more, and for nothing more. He seldom complains, whatever may be his suffering. He receives but little, he subsists on little. His expectations are not great, and are cheaply and easily gratified.

They seem to be healthy, both the men and women. The women will do as much labor in the field as the men, and perform the same labor as the men.

I cannot say that the drinks now in common use add to or in any way contribute to the health and prosperity of the people of Germany. Neither can I say that the common drinks, such as beer and cider, seem to be injurious to the health.

If some kind of drink, beyond water, is to be used, the milder, the weaker, and the purer the drink the better. If coffee can be made satisfactory, it would seem to be the best drink. And I believe that the common hourly use of it in Germany keeps out of use a mass of intoxicating drinks.

I will add that the use of fancy mixed drinks is not known here. There is no standing at the bar to drink, and no bars to attract. You will thus see that the amount of intoxication in this country is much less than in the United States. I attribute the fact to the different kinds of intoxicating drinks in common use, and to the different ways in which those drinks are used.

In the city of Frankfort, with a population of one hundred thousand persons, intoxication is rare. Crime is rare. The health of the people is good. As a whole the people are prosperous. The habits of the people contribute greatly, if they do not wholly produce this state of things.

I take the liberty to send to you herewith certain statistical information in the inclosed pamphlet, which you may be able to peruse. I can find no similar information in any other form.

I have the honor to be, your obedient servant,

W. Prentiss Webster, *U. S. Consul-General.*

Statement of Vice-Consul.

The chief intoxicating article used in Frankfort and vicinity is the common brandy distilled from potatoes. Twenty years ago the city and country were full of dram-shops, which, owing to the im-

provement of the beer and the introduction of coffee amongst the laboring class, have nearly entirely disappeared. At that time the out-door mechanic, such as carpenters, masons, and those employed in factories, who live out of town, had merely one warm meal, which was the supper. Their breakfast, dinner and vesper consisted then of brown rye-bread, some home-made cheese, and common brandy. The latter was then taken in large quantities, and they became gradually drunkards and ended in misery.

The field laborers, men as well as women, employed upon the farms, come in the spring from the mountains, very sterile parts, where, during the winter, the men are employed as wood-cutters, and the women spin, and live mostly upon what they have earned during the summer as farm laborers. They receive there regular meals, dinner and supper, and generally two pounds of rye-bread, and a half bottle of common brandy.

It has been in vain tried to give them, instead of the brandy, the money therefor; but they prefer (men and women) to take their ration of brandy, which after awhile proves not to be sufficient for them, and they spend for more their hard-earned money. Most of the drunkards now seen consist of this class of people, whose winter habits in the mountains follow them to the fields and to the city.

The middle classes of the people of this part of Germany drank heretofore, as a beverage, cider, principally in the evening, often to excess. As cider, drank in large quantities, produces generally sourness of the stomach, they added, in the belief of remedying this, a glass or more of brandy, and many became in that way drunkards.

The better class, and all able to pay therefor, drank generally light wines, and there were but few drunkards among them.

Such was the state twenty years ago. By the improvements in making better beer, things have been changed. The drunkards have disappeared. A great deal less of cider and wine is consumed. The people now generally drink beer. Many drink to excess even now. Intoxication has decreased.

Now, owing to the fact that in the German army coffee in the morning has been introduced, the young men get accustomed thereto. At noon they now cook themselves coffee instead of drinking, as heretofore, brandy with their bread. They drink now also in the afternoon coffee or beer. So that now they consume little or no brandy. The field laborers, men as well as women, continue, however, to drink brandy, notwithstanding that in the morning on many farms they now receive coffee.

The laws of Prussia do not allow intoxication as a plea in the defence for crimes. It is left to the judges to take accidental intoxication into consideration. No statistics are therefore kept as to the causes of crime. Intoxication continually occurs, not habitual, and not causing crime; but it is more accidental, from over hilarity in drinking.

It cannot be said that the general health of the people has suffered or suffers in this part of Germany. In the city of Frankfort, with a population of one hundred thousand persons and an average annual mortality of fifteen hundred persons, hardly an average of five persons have died of delirium tremens.

As a general fact in Germany, in those parts where wine grows and where the chief beverage is beer, there, intoxication is less and has been decreasing.

The contrary is the case where there are large distilleries, and more ardent spirits are consumed.

It cannot be said that the prosperity of the people has suffered. If it has not increased in equal rate with other countries, it is more in consequence of the increased extravagance in the luxury of dress among the females, and the passion of hunting after pleasure. During the winter, not only all the beer-houses, but all other places of amusement are now filled. In summer, public gardens and excursion-trips and the amusements of the Sunday generally use up the earnings of the week. Very few of the common people lay up money.

FLORENCE, May 20, 1870.

SIR:—I have received your circular of February 23, 1870, asking information in regard to the use and effects of intoxicating drinks in Italy, and I proceed to reply.

The intoxicating drinks consumed in Italy are,—*First.* The native wines of the country, which are abundant and very various in quality. In general the Italian wines are not so light as those of western France, nor are they, though often excellent, so carefully or so skilfully prepared. As in other wine-producing countries, the wines designed for sale are largely adulterated, and the better qualities extensively counterfeited, so that pure wine is scarcely to be had except directly from the producers. As a general rule, Italian hotel keepers in the large towns furnish only such native wines as it is impossible to drink, in order to compel their customers to order foreign wines on which they make a larger profit, and of course travellers, who judge Italian wines by those they take at hotel tables, can form no just opinion of their quality.

Secondly. Foreign wines, imported chiefly from France, and in smaller proportion from the valley of the Rhine, from Austria, including Hungary, from Spain, Portugal and Greece. The foreign wines are used principally by foreigners travelling or residing in Italy, but wealthy Italians consume a good deal of French wine, and the products of the Austrian and Hungarian vineyards, introduced into Venetia and Lombardy during the Austrian rule, have acquired a certain favor in those provinces, and are still imported and used by the inhabitants to a considerable extent. The native Lombard and Venetian wines are generally of inferior quality, and this circumstance also encourages the importation of those of northern growth in preference to the less carefully prepared wines of Southern Italy, to which the taste of the people of the newly acquired territory is not yet accustomed.

Thirdly. Spirituous liquors, generally of inferior quality, distilled in the country, and a certain amount of French brandy, Holland gin, and American and Scotch whiskey and rum, a considerable part of all which is used as the basis of different liquors and cordials. The employment of distilled spirits as a beverage, except as an ingredient in cordials which are taken in very small quantities, and as a zest for coffee, is recent in Italy, and is due principally to the diminished quantity and increased price of wine, in consequence of the prevalence of the grape disease.

Fourthly. The same cause has greatly increased the consumption of beer which is both manufactured in Italy, and imported from the German States. The malt liquors preferred by the Italians are mild, and as their table does not tempt them to excess in these beverages, it is perhaps hardly just to class such liquors among the intoxicating drinks consumed in Italy.

I am not aware of the existence of any trustworthy statistical information in regard to the amount of crime produced by intoxicating drinks in this country, but, if one can trust the police reports, the excitement of intoxication is the source of a by no means inconsiderable proportion of the offences which are brought to the notice of the public authorities.

So far as my observation extends, I should judge that the breaches of the peace and other violences traceable directly to intoxication, are much more frequently due to the use of ordinary distilled liquors and of absinthe and other like detestable mixtures, than to that of wine.

Wine is used in Italy as a beverage for quenching thirst, or as an accompaniment of solid food, and but rarely for the sake of its action as an excitant. It is the habitual every-day drink of the

people, from a very early age, and it does not, when taken in the moderate quantity which satisfies a common Italian appetite, seem to produce the same stimulating effect upon their constitutions as upon those of nations less accustomed to it.

The educated and refined classes make very little use of distilled liquors, domestic or foreign, and they seldom indulge freely even in wine, though it is always within the reach of every one, except the poorest. Intoxication is therefore extremely rare among persons of even no more than average culture, and it scarcely occurs except among the badly fed, badly clothed and badly sheltered, who have too often become previously debased by indulgence in other vices. In short, intemperance is not so prevalent in Italy as to rank among the great social evils which force themselves upon the attention of the criminal legislator, the public economist and the philanthropist alike, and the subject has but little of that terrible importance which attaches to it in the United States and the British Empire.

I have no doubt that this remark is equally applicable to most—I am sorry I cannot say all—wine-producing countries, and I am inclined to the opinion that an abundant supply of cheap, light wines would tend, in the long run, to diminish rather than increase intemperance in the United States.

But this is a question upon which I cannot venture to pronounce confidently, without fuller information than I possess and more mature consideration than I have been able to bestow upon it. The climatic and other physical conditions of the United States, not to speak of long established habits among the people, are so different from those of European vine-growing countries, that we must use much circumspection in reasoning from one to the other. Aside from the mere gratification of the palate, the habit of smoking—for the Italian is guiltless of the filthiness of chewing—tobacco is almost the only provocative of intemperance which is common to the people of the United States and those of Italy. Each country has its special temptations and incentives to this vice, but in Italy they are more easily resisted, the habit of indulgence in stimulants is more readily conquered, and there is no possibility of doubt that intemperance is both a vastly more common and a more destructive vice in the United States than in the European countries situated between the same parallels.

From the effect of a cold winter climate and a more abundant supply, the American consumes habitually a very much larger proportion of animal food than the inhabitant of Southern Europe, and this he seasons with a much greater quantity of salt and other thirst-excit-

ing condiments; the frosty air, which he inhales with every breath for a large part of the year, smites his vitals with a chill which seems to demand a fiery fluid for its expulsion, and when the short season of agricultural toil returns, he uses more muscular effort, and that too during the hottest months of the year and the hottest hours of the day. These circumstances create in the American a chronic appetite for drink which is not easily assuaged by "thin potations," and he craves, if he does not actually need, beverages rather strongly *accentuated* in their appeals to the palate.

It is certainly not probable that persons long habituated to the use of distilled liquors would readily abandon them for the milder wines, or indeed for any fermented drink however generous, and cases would no doubt occur, where persons previously altogether abstemious would be seduced into excess by the temptation of a cheap and agreeable drink, the intoxicating properties of which might be as questionable, or at least as stoutly disputed as those of lager beer, but it is to be hoped that the use of light wines, especially at meals, would prevent the formation of habits of indulgence in stronger beverages by thousands who are now ruined in mind, body and estate by intemperance.

I am, sir, respectfully yours,

GEORGE P. MARSH.

FAYAL, AZORES, 15th May, 1870.

SIR:—Your favor of 23d February, via Lisbon, only reached me on the 28th ult. I regret that I cannot give you any information worthy of your notice, in regard to the very important and interesting subject on which you wrote.

Until the almost entire destruction of the vines in 1855, comparatively little spirit was consumed in these islands, the common wine of the country, which was freely used, costing only from eight (8) to ten (10) cents per gallon. At present, wine is quite expensive and rum has taken its place, but I cannot say that there has been any marked increase of intoxication. These people, like all the Latin races, I believe, are far more temperate than the Anglo-Saxons, and there is *very much* less intoxication here than in the United States. No statistics are to be had of the amount of intoxication and crime resulting therefrom, but the islanders (of the westernmost islands especially) are a quiet, inoffensive people and crime is very rare. I sincerely wish that I could have been the means of throwing more light on the important inquiries you are making, and remain,

Yours respectfully,

JOHN P. DABNEY.

GENEVA, May 2, 1870.

DEAR SIR:—In reply to your questions, 1st, what are the chief intoxicating drinks used in Geneva and vicinity? and, 2d, what amount of crime is produced by them and their effects on health and prosperity of the people?

I answer to the 1st, the most deleterious intoxicating drink used here is *absinthe*, which is a strong and generally mean *eau-de-vie* flavored with wormwood (not brandy, for this is called *cognac* or *champagne fin*), made of the must of poor grapes, or perhaps of potatoes, and paralleled in our country by that pine-top whiskey or apple brandy, which "are warranted to kill at forty rods;" next to this is a mean white wine, which taken in excess, destroys the digestive organs. If, which is rare, one of the better class of men is given over to the disease of intemperance his career is generally ended with absinthe. For the poor, the destroyer of health and promoter of quarrels is the aforesaid white wine.

An experience of several years has satisfied me that there is far less intoxication, and crime as its resultant, among the Swiss than with us. A stranger would be deceived as to this by noting the multitude of *cafés*, which answer to our saloons or restaurants, and the crowds which frequent them; but an attentive observer will note that rarely is any one seen to leave the better class of cafés the worse for what he has drank—which is coffee or beer or wine or a small cordial glass of brandy with a lump of sugar—but he will also be surprised to find so much quiet in a large crowd where there are persons engaged with newspapers or playing chess or cards or billiards, or in earnest conversation around tables where half a dozen may gather, and all furnished with the means of exhilaration. The truth is wine, *vin ordinaire*, or the wine of the country (known among us as claret) is the daily drink of every family whose circumstances will permit it, and this includes all but the very poor. This wine is less exhilarating than our cider and more healthy, and to this, and the quiet lives of the people, may be attributed the absence of drunkenness, for it is not common to see a staggering drunkard in the streets here.

I have never seen any statistics of crime in Switzerland.

The prosperity of this people would be increased by a diminution of the number of cafés where they waste their time rather than their health.

Very respectfully, your obedient servant,

CHAS. H. UPTON, *U. S. Consul.*

LEIPSIC, May 4, 1870.

DEAR SIR:—Your favor of February 23, making inquiries concerning the chief intoxicating articles used in Leipsic, and the amount of crimes produced by them, has been received. In reply I have the honor to give you a few, only approximately correct, statistics relative to these inquiries.

The chief intoxicating articles used in Leipsic, are *beer* and *wine*. Comparatively little whiskey or rum is consumed as beverages. Among a population of about 95,000 inhabitants (independent of the large floating population during the three annual fairs), there are annually consumed in Leipsic about 400,000 gallons of beer and 150,000 gallons of wine.

The number of arrests made by the police during the month of April was 506, of which number were 42 for drunkenness. This, according to my recollection, is a fair average of the arrests made during every month of the year, so that among the annual arrests of 6,072 persons, 504, or nearly eight per cent. of those arrested, are arrested for drunkenness, or a little more than one-half per cent. of the entire population. That drunkenness occurs unknown to the police I freely admit, but, I believe, so far as my observation goes, not half as much as in American cities of a like number of inhabitants.

As to what amount of crime is produced by the use of beer and wine I have no data according to which I might make my calculations. But so far as the publicity of these crimes is concerned the percentage, according to my observation, is comparatively small.

As to the influence of these drinks upon the health and prosperity of the people I have no means of judging except my own observation. I cannot say that either my own observation or the opinion of physicians teaches me that a moderate use of these drinks acts in a deteriorating manner upon the health of the public; for, according to the testimony of physicians, the general health of the public is good. Of course there are always exceptions, and perhaps many.

As to the influence of these drinks upon the prosperity of the public I have no data except my own observation. Considering, *first*, the comparatively low wages of the laboring classes; and, *second*, the universal practice of smoking cigars, independent of, and during, the drinking of these beverages, I cannot but believe that both these practices consume a comparatively large amount of the weekly wages of the laboring classes, thus reducing their home comforts to the lowest possible degree, and producing in many cases an actual want of the necessaries of life.

I have given you, without fear or favor my opinion, based upon

my observation, concerning the amount and influence of intoxicating drinks consumed in Leipsic. Of course in some particulars I may be, for ought I know, wrong.

Very respectfully yours,

M. J. CRAMER, *U. S. Consul.*

UNITED STATES CONSULATE, TOWER BUILDING, SOUTH WATER ST.,
LIVERPOOL, June 13, 1870.

GENTLEMEN:—Your letter making inquiry about the influence of intoxicating drinks upon the people of Liverpool and England was duly received. Not having the requisite information myself to make a correct and proper report upon the subject, or the time to spare from my official duties to obtain the facts, I referred your letter to an esteemed friend, not only competent but reliable, to obtain them for me. I now have much pleasure in enclosing to you Mr. Patterson's report. His knowledge of the subject and his character and standing as a man are a sufficient guarantee for what he says, and if more were necessary I might add that my residence for more than eight years in the country confirms me in the belief that he has not in the least overstated or exaggerated the truth.

I am, sir, very respectfully, your obedient servant,

THOMAS H. DUDLEY.

LIVERPOOL, May 27, 1870.

THOMAS H. DUDLEY, ESQ., *U. S. Consulate, Liverpool.*

MY DEAR SIR:—In acknowledging receipt of your note and replying to your inquiry as to the influence of intoxicating drinks upon the well-being of our population, I have judged it advisable to accompany my remarks by two documents, bearing upon the question in its moral and physical aspects.

The first is the report and abstract of evidence upon intemperance of a committee of convocation of the province of Canterbury, being the highest ecclesiastical authority of the Established Church, and they, after an exhaustive examination, concur with the opinions heretofore expressed by Presbyterians, Methodists, Baptists and others as regards the evils inflicted upon the people by the excessive use or abuse of intoxicating drinks, whilst they attribute the prevalence of this vicious abuse largely to the facilities for obtaining the same, and that, in the cases where landed proprietors have prevented the opening of drinking-houses upon their property, great blessings have resulted in the peace and sobriety of such parishes.

The second document is one of a more local character. The coin-

cidence of an excessive death-rate in Liverpool with an increase of public-houses led to much discussion, and the policy of the magistrates in opening the trade to all comers with suitable houses against whom no bad characters could be proven was impeached, not because it shut the door against favoritism, which was a good thing but because its (impartial) operation added to the numbers of a trade already excessive in the town. This led the town council to an examination, and I may remark that so far as I know no teetotaller had a place, as none has at present, upon the magisterial bench or the town council, whilst upon the latter body the liquor traffic has a powerful representation, and a brewer and owner of a large number of public-houses was a member of the sub-committee of the health committee of the town council, appointed to inquire into the mortality of the town. Their report, page ix, assigns to intemperance the foremost place as a cause of increased death-rate, and in my humble opinion rightly.

There is a topic upon which I am, perhaps, not competent to enlarge, nor can I readily refer to printed evidence beyond margin, but which I would venture to indicate as deserving of attention, namely, the increase of drunkenness amongst women. Our respected stipendiary (police) magistrate has, in my hearing, remarked upon it as one of the saddest features of our black record in Liverpool. It can hardly be doubted that the increase of beer-houses has, by carrying drink to nearly every corner, largely contributed thereto.

Another point deserving more investigation than I can give to it is how far incautious alcoholic medication may contribute to the increase and perpetuation of drunkenness. It is only by the medical profession such can be explored and remedied, but there is a growing feeling amongst social reformers (in which I share) that not only are nurses and other officials in our hospitals, &c., exposed to demoralization from the quantities of alcoholic drinks passing through their hands or under their care for supposed medical uses, but that in many cases a taste for the article may be formed or (more frequently) revived by the administration of liquor in a palatable form, and, however valuable as a medicine, it appears needful that more care should be taken in its exhibition. The remedies suggested for the cure of existing evils are mainly upon the one hand moral suasion and temperance pledges, which are much relied upon by some teetotallers, whilst others go for legislative restrictions upon the traffic. Upon this persuasive or pledge aspect of the case it may be remarked that whilst most indisputably great good has been done by teetotallers both in the prevention and cure of drunk-

enness, and especially by preventing the use of drink amongst the young, thus guarding against the habit, multitudes who have signed pledges do not now abstain, and it is doubtful if much over ten per cent. of our adult population are abstainers from choice continuously. Whilst trade and social usages still make drinking alcoholic liquors an institution, no party or organization has yet adopted (here) the Maine liquor platform, but the United Kingdom Alliance proposes to give to parishes and municipalities (by imperial legislation) powers to prohibit the common sale of intoxicating drinks upon the vote of two-thirds of the rate-payers to that effect.

Another organization exists for the suppression of Sunday trading and another for restriction and regulation of hours, &c., of public houses, whilst another section of reformers (who are not yet an organization) suggest that legislation either imperial or permissible to localities should close drinking houses, but not prevent the importation, manufacture, or sale of drink "not to be consumed upon the premises," leaving all persons at liberty to buy and consume at their own houses. This latter would probably involve the recognition of hotels as the temporary homes of *bona fide* travellers and permit sale of drink in them to their lodgers. To this latter section of opinion Dr. Temple, Bishop of Exeter, has given the weight of his experienced judgment.

The non-abstaining reformers indicate mainly two agencies, one, the competition of scientific pursuits and amusements upon the Lord's Day with the open public-house, but it is justly responded that the people who drink evidence no such predilection for museums, scientific lectures, &c., as to make the experiment hopeful, whilst its friends do not evince much confidence in its success or they would provide such gratis, as is done by professors of Christianity who hire lecture halls, theatres, &c., for the preaching of the Gospel without money and without price.

The scientific demand, not a very loud one however, being that public servants in museums, libraries, &c., who are paid for six days' work should labor seven. The only legal obstacle, so far as known to me, being that as no charge can be made for admission on the Lord's Day to lectures or concerts they cannot be made self-supporting. That amusements would check drunkenness is a theory somewhat insisted upon, but as to which few, if any, proofs are alleged.

The sheet-anchor, however, of social reformers who are opposed to repressive legislation is education; educate the people, say they, and they will not drink. But at the threshold practical men meet this by denying that it can be done. Twenty thousand street Arabs

need education in Liverpool, but they need food first; as they are the children of drinking parents they must beg or steal, sell matches or in some inscrutable way get bread; shut them up in schools and educate them; £40,000 per annum will do this; but to feed them, and feed you must, if the parents go on drinking, £200,000 more is needful. Besides it by no means follows that in the next ten years your 20,000 will fall to 10,000 needing sustentation. It is more probable it will increase to 40,000, as, if the drunkards' children are fed and educated at the public cost, an increase may be expected to follow from natural law.

I have endeavored to place before you facts and theories, well knowing that the intelligent persons for whom you seek the information are well able to sift, and I hope in due time to be favored with a sight of the results of their inquiries.

Some extended knowledge of the people of this United Kingdom and short visits to our great colonies upon the St. Lawrence, Hudson, Delaware, Chesapeake, Ohio and Mississippi, as well as "the Hub" itself, have impressed me with the idea that our Great Family have a mighty part to play in the world's history, but that if the Anglo-Saxon race is to lose its primacy amongst the nations it will be from the miry clay of drunkenness destroying the cohesion of its iron nature, and whenever the stone may strike the right foot in England or the left in America it will be the just judgment of the mighty Ruler amongst the nations, who is even now warning us unmistakably to set our houses in order if we would retain the high place he has given our ocean-parted yet heart-joined nation in the midst of the earth, for England and America are one in origin and destiny. I remain, my dear sir, yours faithfully,

JOHN PATTERSON.

P. S.—Adulteration is alleged upon most respectable authority to be chargeable with much of the deadly effects of drink, but I am not aware of any facts disclosed upon coroners' inquests or elsewhere which indicate that one person out of each hundred "slain by drink" was poisoned by any substance other than alcohol. J. P.

LONDON, 21st April, 1870.

DEAR SIR:—Your letter of 23d February last, requesting on behalf of the State Board of Health of Massachusetts information in regard to the influence of intoxicating drinks on national health and prosperity, was received a few days ago.

You propound two questions: 1st, "What are the chief intoxicating articles used in England?" In reply, I have to say that

the Board of Trade returns show that for the year 1869 there were bought in Great Britain for home consumption,—

Of foreign wine, ...	15,151,741	gallons.
Of home and foreign spirits, ...	29,407,499	"
Of ale and beer, ...	896,533,056	"

You ask, secondly, as to the amount of crime produced by them, and their effects on the health and prosperity of the people, with which question is coupled another as to the relative amount of intoxication in Great Britain and the United States.

You will pardon me if I do not attempt to give any answer to these inquiries.

The subject is too vast and too grave for me to treat of it superficially, and I have not the time, consistently with my attention to absorbing official business, to make investigations which would be of value to you.

I enclose two pamphlets, which seem to me to contain considerable and interesting information on the subject of temperance, although they have an unpretending appearance.

It will give me pleasure also to send you such other statistics or official information as I can find.

I am, very respectfully, yours,

JOHN LOTHROP MOTLEY.

UNITED STATES CONSULATE, MALTA, 13th May, 1870.

DEAR SIR:—In reply to your circular letter, dated 23d February, 1870, I have to say:—

1st. The chief "intoxicating articles" used in Malta are, for the native population, a common white wine imported from Marsala, Sicily, and a common red wine from Riposto di Mascali, Sicily, sold at three to three and a half pence per quart bottle.

The lower orders use also a common brandy from Sicily, frequently mixed with anise-seed.

The better classes use the principal wines of Europe, chiefly the red and white French wines, Madeira, Marsala, port and sherry, besides a sort of stomachic, which I hear is coming into favor, compounded of spirits, Peruvian bark and cloves or cinnamon. No wine is made in the island, and, I believe, no spirits.

As for the foreign population, which is almost exclusively English, their habits here are precisely what they are in all other parts of the world. They eschew the lighter wines, and drink beer of all

brands (English), heavy wines (sherry, port, Madeira and Marsala) and spirits.

2d. In the absence of any government bureau of statistics, I cannot accurately give the amount of crime due to drunkenness or effects on health and prosperity of the people. Among the soldiers and sailors—from five to six thousand—there is the usual amount of drunkenness to be found in a great garrison town. One of the chief surgeons of the fleet tells me there is more *pulmonary disease* among seamen here than at any other station in the British service, but he does not account for it.

The native population is certainly very temperate. The amount of drunkenness to be seen here is as nothing compared with what is seen in the United States. Yet I am told there is a manifest deterioration within the memory of observers—more intemperance and more disease or debility than a generation ago. I think it is due to the presence and example of the garrison.

Respectfully, your obedient servant,

LYELL T. ADAMS, *U. S. Consul.*

MANCHESTER, May 19, 1870.

DEAR SIR:—I have this day forwarded to you through the State Department an answer to your letter of 23d of February last making inquiries in regard to alcoholic drinks in this country.

I also send a report of the Committee of Convocation.

If your letter was mailed on the day of date, it must have been detained a long time on the way.

I am, respectfully, yours,

C. H. BRANSCOMBE, *U. S. Consul.*

UNITED STATES CONSULATE, MANCHESTER, May 19, 1870.

SIR:—In reply to your letter of inquiry dated February 23d, 1870, I have the pleasure to give the information attached, the result of investigations pursued by me personally, and by English friends with whom I have put myself into communication upon the questions referred to.

1. The principal intoxicating liquors used in England are gin, brandy, beer, wine and cider. The wine is chiefly imported, though varieties of "British wines," made from currants, &c., mixed with distilled spirits, are manufactured and sold. Among spirits, gin is chiefly used by the poorer classes and brandy by the richer; beer (including ales of every kind) is most largely used by all classes; wine is used by the wealthier, though cheap and highly

adulterated sorts are also in extensive use among the middle classes; cider and perry are mostly confined to some of the agricultural counties of the west and south.

In Scotland and Ireland the principal alcoholic liquor used is whiskey, though wine and beer are also consumed to a considerable extent. Since the reduction of the duty on brandy, this liquor is competing more than formerly with home-made spirits.

Rum is chiefly used by the middle and lower orders of the three kingdoms. Professor Levi estimated that, taking the proof spirit in each kind of intoxicating drink consumed in each kingdom, the consumption of proof spirit in 1866 per head was as follows:—

PROOF SPIRITS USED.	ENGLAND. Imperial Gallon.	SCOTLAND. Imperial Gallon.	IRELAND. Imperial Gallon.
In Gin and Whiskey, . . .	0.536	1.659	0.800
In Brandy, Rum, &c., . .	0.328	0.188	0.057
In Beer and Ale, . . .	3.393	1.050	0.710
In Wine, ...	0.159	0.087	0.064
In Cider and Perry, . . .	0.021	–	–
	4.437	2.984	1.631

(English proof spirit is about one-half alcohol and one-half water, or exactly by volume, alcohol .57, water .43; by weight, alcohol 49.24, water 50.76.) Thus the annual consumption of alcohol in England, chiefly in the form of beer, is two gallons and a gill, in Scotland one gallon and nearly a half, in Ireland rather more than four-fifths of a gallon. There is, however, no means of accurately estimating the quantity of beer and wine used in each kingdom distinctively, the estimate of the population of Ireland in 1866 being more uncertain than for that of either England or Scotland.

2. All the law, judicial, police and other authorities in this country concur that a very large proportion of the crime and poverty, sickness and premature death, is caused by the drinking habits of the people; and not merely by the grosser forms of intoxication which too visibly prevail. Of crime, it is considered that two-thirds, and of poverty three-fourths, arise directly or indirectly from the use of alcoholic liquors. Much valuable information on this subject is contained in the report of the Committee of Convocation appointed to inquire into the extent and action of intemperance, a copy of which accompanies the present letter.

Here, as in the United States, the drinking customs render much

crime possible which else would be impossible; they also prompt and excite to criminal offences of all kinds; they bring great numbers into a condition where they readily become subject to criminal attacks; and they plunge vast masses into a low and degraded social state, from which the transition into crime becomes easy, rapid, and humanly speaking, in the case of multitudes well nigh inevitable. The statistics of drunkenness give no proper conception of the extent of that vice; for, unless incapable or violent, intoxicated persons are seldom arrested, and the process of manufacturing sober men and women into drunkards goes on with steady regularity in the drinking shops of all classes without any practical hindrance from the administration of the law. So long as very flagrant and repeated disorder is avoided, the publican or beer-seller is sure to remain in undisturbed possession of the license when once granted; and even where police charges are made and convictions ensue, a reprimand or warning is usually all that is administered at the annual licensing day.

Upon health, life and commercial prosperity, the drinking customs act very injuriously, and not least when the signs of external excess are absent. The great quantities of beer drunk in England slowly but certainly sap constitutional vigor, and, according to high medical testimony, there is no form of disease which does not find food and fuel in the vital degeneration brought about, even where there is a complaisant confidence in the innocuousness of so-called "moderation."

The inquests in England and Wales (inquests are not held in Scotland and Ireland) in the year ending September 29th, 1868, were 24,774, and every coroner confesses that, besides the number of cases in which excessive drinking is distinctly named as the direct cause of death, a very large proportion of the other cases springs, either from the physical effect of intemperate or tippling habits from the congenital disease, or from the destitution or recklessness connected with the drinking habits of fathers and mothers.

The commercial interests of the country suffer sadly by the poverty and pauperism, created by the idle and irregular habits thus induced, by the loss of skill and vigor attending alcoholic indulgence, and by the enormous expenditure of money on the purchase of intoxicating liquors, amounting to a hundred million sterling, besides the waste of grain, capital and labor, in the production of such drinks, and above all, of the labor force wasted in the excitement of drinking.

3. Comparing certain towns in the two countries most nearly alike, as Liverpool and New York, Bradford and Cleveland, Bristol

and Boston, and certain corresponding classes, such as the commercial, the fast and the fashionable, one does not see much difference as to the prevalence and results of drinking. The disorder, degradation, pauperism, prostitution, lunacy and crime are in both appalling. But on the other hand, looking at the moral and religious classes in the smaller towns and villages of the two countries, comparing the social and domestic usages of the respectable classes of our New England States, or of Pennsylvania and of Ohio, with the corresponding classes and communities of England, there can be no doubt that the balance of sobriety is very greatly in favor of the former, and more particularly of Connecticut, Rhode Island, New Hampshire, Vermont, Massachusetts and Maine.

In this country there are hundreds of villages, some large districts and several little towns, from which the liquor traffic has been banished by magisterial and proprietorial power with the most gratifying results. Crime has ceased, pauperism has almost vanished, lunacy has disappeared, and industrial and moral progress has been made. These facts seem to have taken hold of the hearts and thoughts of the people, and some years ago an agitation (under the direction of the United Kingdom Alliance for the Suppression of the Liquor Traffic) was commenced, which has risen into great political influence. Its parliamentary leader, Sir Wilfred Lawson, Baronet, M. P. for Carlisle, supported by Sir Thomas Bazley, Baronet, M. P. for Manchester, is about to introduce for the third time, his Permissive Bill into the House of Commons, which proposes to give to all the rate-payers and owners of property the power to veto the common sale of intoxicating liquors within their parish or district. The second reading of this bill is fixed for the 13th July next. Eight hundred theusand persons petitioned for the passing of the bill last year, and 94 members voted for it, representing a constituency of 7,000,000.

I remain, yours, very respectfully,

C. H. Branscombe,

United States Consul, Manchester.

United States Consulate, Odessa, Russia,
May 4, 1870.

Dear Sir:—In reply to the questions placed in your favor of February 23d,—

The chief intoxicating article used here is "vodka," or in plain English, *whiskey*. It is made and sold under the direction of the government. It is prepared in different forms,—that is, clear and

pure; clear and sweetened; colored (in tempting colors), such as green, red, yellow, rose; and also flavored with different spices and herbs. It is sold, I am told, in something like two thousand "licensed horrors" in this city, and at every little village and station all through the country, at the very moderate price of about three to five cents a gill. This is the strong drink of the common people (as they are called), emancipated serfs, laborers, soldiers and their females, who frequently outdo their husbands and brothers.

Wine is made (red and white) in large quantities in the Crimea, in Bessarabia, and in the different German villages (of which there are many in the south of Russia), and to some extent in the Russian villages. Quantities of it are brought into this place in large casks (of two hundred gallons) in the autumn, and sold (the pure unfermented juice) for, say, twenty to fifty cents a gallon, and afterwards retailed out at higher prices, say, twenty to fifty cents a bottle. Excellent brandy is distilled in some places from the wine of this country. Beer and ale are also made here. Besides this, all kinds of liquors, wines, cordials, beer, porter, are imported from other countries and sold without restriction except the duties and tax for license. These articles are mostly used by the different strata of society above the "common people" or peasantry.

It is the custom, very general with these classes, to have wine at least for dinner (frequently for breakfast also, at ten, eleven or twelve o'clock), and very often they begin with a small glass of raw brandy or other spirit.

There are wine tipplers and jolly parties who drink wine and beer (perhaps even spirits) at all hours of the day and night, but such persons are, for the most part, idlers and shiftless persons or young rowdies, the custom being to drink little at other times than breakfast and dinner. It is rarely seen, a drunken person of the classes last mentioned.

You may meet them, often enough a little hazy after dinner, and often enough their appearance indicates free living, but seldom are they to be seen past perfect self-control.

Those who drink "vodka," on the contrary, are often to be seen staggering about (men and women), or lying in some corner insensible. This is much more often the case on Sundays and holidays, of which latter the number is very great in Russia.

There are no statistics as to the amount of crime chargeable to intoxicating or exciting drinks, but from my own observation, I should say at least three-fourths of all. They are, without doubt, a great plague and drawback to material and moral progress in this country. The effects of all such exciting drinks are, in my opinion,

prejudicial to the health, happiness and prosperity of those who habitually use them, and, generally in proportion to the freedom with which they are used.

The moderate and immoderate drinkers, if they be habitual, are all sufferers, and visibly sufferers in these three respects. My own belief is, whiskey, rum, gin, brandy, wine, beer, ale, porter,—all bad, and the stronger the worse.

I might add coffee, tea, tobacco and all unnatural excitants of the nervous, muscular and circulatory systems.

Very respectfully, yours,

TIMOTHY C. SMITH.

TENERIFFE, July 15th, 1870.

DEAR SIR:—A very long time has elapsed since the receipt of your favor of February 23d, making some inquiries respecting the use and abuse of intoxicating drinks in this island, the reason for which has been, that there being no statistics on the subject, I asked one of the principal physicians to give me his and some of his colleagues' opinions on the subject, which he promised to do; but Spanish like, this was put off from day to day, until at last he suddenly embarked for Spain, but promising to be back in a month, I still waited for him. On his return he again renewed his promise, but nearly a month having elapsed without his reply being received, I have resolved not to wait any longer, but to address you now in answer myself, and whenever his opinion is received, I shall send it to you.

Your first question is, what is the chief intoxicating drink used in these islands? Up to 1845 this was eminently a wine-producing country, this island alone having produced as much as 25,000 pipes. The oidium having destroyed the vines about that time, the drinks substituted have been the rum of West Indies, and gin of England and Holland. You are of course aware that in wine-producing countries intoxication is rare, and this was the case here while only wine was drank; since then the vice has increased, but not to any considerable degree, although I should say that the use of alcoholic drinks has told upon the health and shortened the lives of many, and perhaps caused some crimes.

I should say that there was far less intoxication here, among a given number, than in the United States, owing to the Spaniards being an abstemious people generally, and I don't know where you can find a soberer class of people than the peasants of these islands.

I remain, your most obedient,

WM. H. DABNEY.

UNITED STATES LEGATION, VIENNA,
June 17th, 1870.

SIR:—In reply to your circular note, dated February 23d (but which did not reach me until a much later date), asking for advice touching the intoxicating drinks used in Austria, and their effect upon the health, prosperity and morals of the people, I beg to say that I have delayed my response, in the hope of procuring some reliable information, which I have not yet received.

Upon the receipt of your letter, I requested Mr. Delaplaine, the Secretary of Legation at this post, who has lived in Vienna some sixteen years, and has a large circle of acquaintance, to apply to such gentlemen as he thought might be able and willing to answer your questions.

Most of those to whom he applied seemed unable or unwilling to give their assistance, but Dr. Adolph Ficker, one of the Court Counsellors, and a Director of the Administrative Statistical Bureau, obligingly promised to examine the matter carefully, and report in writing, with statistics of the amount of alcoholic and other liquors consumed in the empire. As the promise was given several weeks since, Dr. Ficker's report has been for some time expected at the Legation, but it has not yet been received. I have also made a request at the Foreign Office for such information as may be gathered in the Bureau of Statistics, and I am in hopes of being soon able to send you, in part at least, satisfactory answers to your questions.

In view of the short time that I have been in Vienna, and of my very limited opportunities of observation in the provinces, I am sensible that my opinion (for which you are pleased to ask) upon a question so properly soluble by statistics, and by a comparison of the opinions of many experts, can be of little practical value.

I am advised by those in whose judgment I have confidence, that the chief intoxicating drinks in Austria are beer and wine, and that but comparatively a small amount of spirituous liquors is consumed, excepting in Gallicia; that the relative consumption of wine by the people is diminishing, and that that of beer is increasing; that the beer in general use is of a light kind, requiring the consumption of a large amount either to stupefy or to intoxicate; and that the influence of intoxicating drinks in Austria in producing crime is less marked than in our own country, and in England.

Touching "the relative amount of intoxication in the country where I am residing and that seen in the United States," I may say that I have seen more intoxicated persons in the streets of New York in one day than I have chanced to see in Vienna during the past year. I am sir, very respectfully yours,

JOHN JAY.

[TRANSLATION.]

REPORT FROM STATISTICAL CENTRAL BUREAU OF AUSTRIA, TRANSMITTED THROUGH THE I. R. MINISTER OF FOREIGN OFFICE TO MR. JAY.

Consumption of spirituous liquors in Austria-Hungary.

The use of spirituous beverages in the Austro-Hungarian monarchy can only with approximate exactness be determined from the annual production, and with proper consideration of the transfer in way of trade. We here present estimates of the following quantities for the whole monarchy during the last five years:—

Production and Consumption in Austria-Hungary, from 1864 to 1868.

	Quantity.	1864.	1865.	1866.	1867.	1868.
Production,	Eimer,*	13,848,979	13,943,217	13,597,450	12,887,591	13,833,844
Import,	Eimer,	8,507	7,507	4,695	4,395	5,669
Amount,		13,857,486	13,950,724	13,602,145	12,891,986	13,839,513
Deduct export,	Eimer,	88,139	136,569	130,115	216,433	289,875
Total consumption,		13,769,347	13,814,155	13,472,030	12,675,553	13,549,638

Production and Consumption of Wine in Austria-Hungary, from 1864 to 1868.

Production,	Eimer,	18,760,600	18,760,600	18,760,600	18,760,600	18,760,600
Import,	Eimer,	92,244	124,866	72,684	73,428	81,174
Amount,		18,852,844	18,885,466	18,833,284	18,834,028	18,841,774
Deduct export,	Eimer,	227,366	169,826	161,730	206,713	254,585
Consumption in the country,		18,625,478	18,715,640	18,671,554	18,627,315	18,587,189

* According to the "American Cyclopædia," the Eimer is equal to 12.457 gallons.

Production and Consumption of Brandy in Austria-Hungary, from 1864 *to* 1868.

	Quantity.	1864.	1865.	1866.	1867.	1868.
Production,	Eimer,	3,255,236	3,371,541	3,457,400	2,945,880	3,666,846
Import,	Eimer,	10,963	11,018	10,854	13,510	14,935
Total,		3,266,199	3,382,559	3,468,254	2,959,390	3,681,781
Deduct export,	Eimer,	70,647	91,529	100,159	152,183	304,310
Total consumption,		3,195,552	3,291,030	3,368,095	2,807,207	3,377,471
Consumption for objects of trade,	Eimer,	651,047	674,308	691,480	589,176	733,369
Balance consumed for drinks,		2,544,505	2,616,722	2,676,615	2,218,031	2,644,102

If there be adopted, pursuant to the official trade valuation during veral years, an eimer beer at five florins, an eimer wine at eight orins, and an eimer brandy at twenty-three florins, the result is, an estimate of thirty-five millions of population, an average nual expenditure for each individual of four florins twenty-six euzers for wine, one florin twenty-nine kreuzers for beer, and one rin sixty-seven kreuzers for brandy, whereby each would expend nually seven florins eighty-five kreuzers for spirituous beverages.

This consumption must be held as being extraordinarily greater if be contrasted with the use of other products, in the quantity of hich a graduated rule for the social development may be found.

So, for example, it is ascertained that out of the annual quantity cast-iron and wrought-iron products and steel in Austria and ungary, 3,560,000 centner in weight are required for the use of e agricultural economy. A centner of weight in such products, timated at nine kreuzers, would allow for the expenditure for iron aring the year the sum of ninety kreuzers for each individual of e entire population. Accordingly each inhabitant of Austria-ungary would be expending for spirituous liquors eight times as uch money as for iron, the most important agent of active dustry.

Naturally what has been suggested here can only be regarded as average estimate upon the whole consumption, inasmuch as e use of spirituous beverages varies exceedingly not only with lividuals, but in the different provinces of the Monarchy. Espe-lly can three groups of provinces be named as varying most: the actual German provinces, with Bohemia, Moravia and Silesia, which the consumption of beer plays the most important part; the Hungarian provinces, where the use of wine is greatest; d 3, Galicia, with the North of Hungary, and Transylvania also, t in a less degree, the Alpine Highlands at the west, where st of the brandy is consumed; and although specific numerical tements cannot be adduced, yet the effects of this consumption on the social development is an undeniable fact.

Already the wine-consuming Hungarian population, as regards degree of industrial and professional ability, stands in the eyes every impartial observer much below that which the inhabitants the western provinces of the Monarchy have attained, while the lician peasant, who ruinously exchanges for brandy his corn fore it is ripe and yet in the pod, is lowest in the scale of indus-ial development.

He knows nothing of the valuable resources for improvement in

agriculture, secured through industry and science, and grows visibly poorer.

Indeed the degeneracy of the race in Galicia, although perhaps other agencies may contribute to it, is to be sought mainly in the excessive indulgence in corn-brandy; and thence it comes to pass, that out of the men called to military duty in Galicia, 37.9 per cent. are rejected as unserviceable on account of physical disability and infirmity, and 18 per cent. on account of under stature; accordingly in all 55.9 per cent. of those called are found unserviceable, whilst in the entire Monarchy only 9.2 per cent. appear as unserviceable for the army through under size, and 33.5 per cent. on account of physical disability and infirmity.

Temperance societies have as yet never been started in Austria, and the attempts at such, made particularly in Galicia, in imitation of those in some communities in Russia, have been without a successful result, mainly because of the "Propinations" privilege which exists and produces a large revenue to the landed proprietors, who therefore oppose to the utmost all such attempts, which may reduce their incomes.

I have been informed that the "Propinations" privilege consists in the right, claimed by land proprietors, and included in every lease from them to inn or tavern keepers, requiring the latter to purchase from the land proprietors all stores of spirituous liquors to be consumed in such inns or taverns, or, if that right be waived, then, that a large pecuniary consideration for the same be annually paid to the land owners.

ZURICH, May 10th, 1870.

DEAR SIR:—Your letter making certain inquiries about intoxicating drink, &c., &c., is at hand. In reply permit me to say that my residence here has been of but a few months' duration, hence my observations have not been very extended; but to the questions:

1st. Sour wines and lager-bier are used here in immense quantities. French and German wines are also used, but in much less quantities, by those able to import.

2d. I judge that the per cent. of disorder and crime arising from the use of intoxicating drinks is large. Yet I find no statistics on the subject. I am positive, however, that the effects on health and the prosperity of the people are very bad.

I am credibly informed that in certain cantons where wine in very great quantities is used, steady nerves are *rare*, while a great *tremulousness* of the hand is *common*. I am impelled to believe however, that intoxication prevails to a less extent in Zurich than

in American cities. Poor or sour wine and beer stupefy more than they intoxicate when used in ordinary quantities.

I am not in possession of any printed statistics on the subject, or I would forward with pleasure.

Very respectfully,

S. H. M. BYERS, *U. S. Consul.*

UNITED STATES CONSULATE, FUNCHAL, MADEIRA, }
MAY 8th, 1870. }

SIR:—I have the honor to acknowledge the receipt of your communication of February 23d, last past, requesting certain information in regard to the use of intoxicating drinks, and their effects upon the population of this island.

In regard to your first question, I have to say that the chief intoxicating drinks are wine and cane brandy; the former mild, but yet a heavy-bodied wine, and the latter inferior to the grape brandy of France, yet stronger than our American whiskey.

In answer to your second question, I have to say that the people here are a most exemplary people in the main, in regard to the use of intoxicating articles. Few are seen drunk, or even overly excited from the effects of drink. Indeed one seldom hears of a person being destroyed from its use. Considerable amounts of both brandy and wine are, it is true, consumed by the population, the better classes using wine daily at dinner, and the commoner people using both wine and brandy, without reference to time, but yet in great moderation. You can therefore well understand, that as a consequence, there are but few cases of crime resulting from their use. Indeed, I believe I have not heard of a single case since I am on the island, now going on five years. As to the impression upon the general prosperity of the masses, I think it is somewhat damaging, as the price of ordinary labor is very low, thirty cents per day being the price to a common laborer, which is in itself scarcely sufficient to maintain a family, even in the midst of almost the greatest poverty, since every cent taken from that amount for brandy or wine is most seriously felt by the poor families; and as nearly all drink a little, the amount of absolute poverty is very great.

As to the relative amount of intoxication in this island, as compared to the United States, I must say, that whilst no statistics are kept or collected by any one, yet I have no hesitation in giving it as my opinion, that the difference is greatly against our people in America.

I regret that I am unable to forward you any statistical information upon the subjects you have referred to.

With great respect, I have the honor to be, your very good friend, CHAS. A. LEES, *U. S. Consul.*

UNITED STATES CONSULATE-GENERAL, BEIRUT, SYRIA,
May 9, 1870.

DEAR SIR:—Referring to your communication of the 23d February, I have the honor to observe that the influence of intoxication upon the people of Syria is almost imperceptible.

The native wine is not made in large quantities, yet sufficiently so as to give the middle class population at least, the use of that beverage, but its effect as such, is not to produce intoxication, which is almost unknown. There is, however, a colorless liquid called arak or rakia, which is distilled from the wine or made from the pumice. This is very intoxicating, but is used so temperately as to seldom produce bad results. Dr. Thomson, who has resided in Syria for about thirty-five years, says that he never saw a drunken man during the larger part of that time. During, and since the French occupation, which followed the massacres, foreign wines and some other liquors were introduced, and the former is now to be seen in many of the more wealthy families, yet almost never used to excess. There are two classes of the population upon whom the introduction of foreign brandy and whiskey is known to produce bad effects—the Turks or official class, and the lower foreigners, such as Greeks and Italians. Not until recently could a dram-shop be found, but now there are several, patronized almost exclusively by the low class of foreigners.

Your second question is in effect already answered. There being almost no intoxication, still less can crime be traced to that cause. In fact, very little crime is committed in Syria. Formerly, in the mountain districts of Lebanon, the existence of blood feuds led to many violent deaths, but the killing was done openly and in the name of justice. Three executions by Daoud Pasha, the first Christian governor-general after the massacres, have had the effect of almost suppressing this ancient custom. It happens now occasionally that different villages or factions will have a bloody affray, but the cause is generally some religious superstition. The larger part of the cases which come before the Turkish and consular courts relate to property and contracts, rather than crime. Assault, burglary and assassination are almost unknown, though a few horrible cases of the latter have occurred, yet have never been traced to the use of intoxicating liquor.

If the use of liquor in the general, but temperate manner habitual with this people has a gradual undermining effect upon health or constitution it is impossible to estimate it, nor have medical men given the question their attention.

I do not believe the people are less prosperous on account of its use, according to their customs, not because there would be no saving if they would abstain, but rather because their recreation and dissipation take such a mild, harmless form, that those who are most interested in their welfare would not interfere with their long established and harmless usage, believing that if they were led to abandon these habits—perhaps not entirely unobjectionable—they would in pursuit of recreation fall into the worse habits which a higher civilization generally brings with it.

Whoever has seen these people after the day's confinement in the close, dark, dirty bazaars, and the muezzin has sounded for evening prayers, assembled under large arbors in the public places, generally on an elevation where the cooler winds may reach them, seated on low stools smoking the nargelia, drinking coffee or arak from the smallest of cups, listening perhaps for the hundredth time to a story teller, who with wild gestures is reciting the tale of Ali Baba and his forty thieves; sitting thus for one or two hours after sunset, and then returning quietly to their homes until the streets become as noiseless and deserted as those of Palmyra, most of those who have thus observed their habits will not be inclined to condemn them very severely.

After the foregoing it will be unnecessary to express an opinion as to the relation of the amount of intoxication seen in this country to that of the United States. It would be impossible to give statistics, either as to intoxication or crime as no records are kept. My remarks are the result of observation only; but I am sustained by the opinion of some of the most reliable residents.

I am, sir, very respectfully, your obedient servant,

LORENZO M. JOHNSON,

Vice-Consul-General in charge of the office.

No. 30 CHATHAM STREET, COLOMBO, CEYLON, 13th August, 1870.

SIR:—On the 30th of May last, I had the honor to address you in relation to your letter received on the 17th of that month.

I have found it more difficult than I anticipated in obtaining the required information, either from a disinclination or want of time on the part of some of the government officials.

I am informed a census is being taken, and when the Legislative

Council convenes, which will be in the latter part of September, I may be able to send you more and later information.

Since my arrival in Ceylon, I have been located at the seaports of Galle and Colombo, in the most southern extremity of the island. It will therefore be out of my power, from my own experience, to give you any more information than is customary, where, in a foreign port, the jack-tars of all nations have a day's liberty on shore. From your queries, I am of opinion, you desire more particularly information in regard to the native inhabitants of Ceylon.

I therefore annex copies of letters on the subject, with which I have been kindly favored by parties who have been born on the island or have been long residents, which I trust you will find of interest. The first is from Dr. Julian L. Vanderstraaten, Assistant Colonial Surgeon for the Southern Province.

1st. All the European liquors are used by the better class. Chiefly drink arrack, which is prepared by the distillation of toddy, and is not unlike whiskey.

The juice of the flower and stems of the palm tribe yield the sweet liquor called toddy; it contains sugar, and when drank in the out of the morning is an agreeable beverage which acts like a mild aperient; when the day gets warm it begins to ferment, and in this stage is prepared by the lower classes as an intoxicating liquor owing to its being very cheap. When this is fermented for days, it becomes converted into good vinegar, but the larger quantity is distilled for arrack.

2d. There is no doubt that the sale of arrack at a cheap rate (nine pence half-penny per bottle) has caused a great increase in crime of late. The natives, "Arrack Renters," as they are called, purchase the right of selling arrack from government at the annual sales, and then open taverns in the villages and towns. Under this system the illicit distillation is checked; by which a large revenue is obtained, and the use of arrack becomes much more common than before. The sober and steady class of natives, although exceedingly fond of litigation, seldom commit any serious crime excepting once a year, viz., at their Singhalese New Year, 11th April, when they make merry, imbibing a good portion of arrack under the influence of which they become quarrelsome and end by knocking each other over the head with clubs. It is only in cases of revenge and jealousy that crimes are committed without arrack being the inciting cause. When assassins are hired to commit murder they can only be compelled to do it under the influence of arrack, money being no consideration with men of this class.

The use of arrack, particularly the fresh liquor sold in taverns

speedily induces inflammation of the liver which ends in dropsy. Good old arrack seasoned in wine cases is a choice liquor. It is only served to troops after having been kept for years in store.

"Arrack drinkers are by no means industrious; they sleep away their time, while the female portion of the community have to work for their upkeep."

Dr. Samuel F. Green, of the American Mission, located in the extreme north of the island, has favored me with the following answers to your queries, viz.:—

"1st. Palm toddy and arrack.

"2d. A great deal of crime, the effect on the health and prosperity of drunkards and their households markedly evil.

"3d. I should think it about equal.

"As the sale of arrack and toddy is favored, the comparative amounts paid annually, would elucidate the subject.

"I trust the investigation of the Board of Health may result in the formation of some effective plan, for the lessening of this great scourge of the human race."

The Rev. J. C. Smith, also of the American Mission in the north of the island, writes,—

"My own impressions accord with Dr. Green's,—this system of arrack rents is an unmitigated evil, and ruins many every year. We hope the agitation of the subject may result in checking the increase of the evil."

James Loos, M. D., Member of the Royal College of Physicians, Edinburgh, colonial surgeon, born in Ceylon, has also favored me, viz.: "The chief intoxicating articles in use among the natives of Ceylon are *arrack* and *toddy*.

"Toddy is the juice drawn from cocoanut palm in all parts of the island, except the north, where it is obtained from the palmyra (*Borassus flabelli formis*). The toddy is a favorite beverage. In its fresh state it is sweet and pleasant and can scarcely be said to be intoxicating, but it is not sold in the taverns for use until it has undergone fermentation to some extent, when it becomes sour and intoxicating. The spirit obtained from the distillation of toddy is arrack, which may be said to be the national drink of the Singhalese. The right to distil arrack is sold annually by government with whom it is a source of revenue. The arrack renter, as he is called, sells spirits by wholesale to tavern-keepers. Opium and Ganjah or hemp, are used by the Malays and Hindoos, and some of the natives of Ceylon have imbibed a taste for these drinks, but they cannot be said to be in common use. There is a large con-

sumption of brandy, beer, and the common beverages of the European. These are more plentiful and cheaper in the shops now than formerly, and the natives in towns prefer them to arrack and toddy, which they regard as common and vulgar drinks.

"There is no doubt that a large amount of crime in this country arises from the use of intoxicating drinks, and that their effects on the health and prosperity of the people are very marked. Cases of horrors (delirium tremens) are not found among natives, and it is believed that the use of arrack does not produce it; but I have frequently traced the occurrence of other diseases among the natives, to the abuse of alcohol. I am aware, that in the country, taverns have sprung up of late, which did not exist before, and that dissipation and crime have increased in the villages.

"I fear you are not likely to obtain official statistics of the amount of crime caused by intoxication anywhere. We are still greatly behindhand in such matters. We are only now beginning to take steps to obtain a correct census of the island, and to register properly births and deaths.

"When I had a medical connection with the principal jail in Colombo, it was not customary to inquire into the habits or previous history of prisoners; but it is possible that some advance has been made since that time in the collection of information on these and other points."

I find in the "Colombo Observer" of 21st of July, an article, by its editor, headed,—"Crime in Ceylon and its Causes," which has a bearing upon the subject under discussion, and I think will not be considered out of place:—

"Believing as we do in the dangers of moral contagion, we have endeavored to steer clear as much as possible of the law courts and their surroundings. A period of enforced attendance as juror, however, has certainly given us a view more vivid than ever of the prevalence of crime around us, even in those districts where Christianity, in some form or other, has been taught for lengthened periods. The comparative impunity too with which wrong-doers can long pursue a career of crime, without the arm of justice being able to reach them, has been forcibly impressed upon us by the details of a case from Minnangodde near Negombo, which occupied the whole of the 19th, and with reference to which the jury felt compelled by a sense of duty, to ask the presiding judge to make a representation to the executive government. Minnangodde is close to Negombo, which is the seat of a district judge, the village has the usual complement of peace officers, and a regular police station stands within a short distance of it. The Roman Catholic missionaries have been at work around Negombo for centuries, and for about half a century the Wesleyans have done their best for the people, and yet with reference to events which took place near Minnangodde in December, 1869, the serious attention

of the executive government has to be called to the fearful state of disorganization and crime into which the district had fallen. A regular manufactory of crime and criminals seems to have been kept for years by the Vidahu of the village, where cock-fighting, gambling, and arrack drinking were pursued day and night. At length a wretched gambler was deprived of life in the Vidahu's 'hell,' and although all who ought to have aided justice (including the regular police) seem to have done their best to defeat the efforts made to punish the criminals and repress crime, retribution at last overtook the leading wrong-doers. Under the auspices of the Vidahu, at his direct invitation, it would seem a crowd of people, not fewer than a hundred probably, assembled to witness cock-fighting, to drink arrack illegally sold to them, and to take part in gambling. Those who went inside the gambling house actually paid an entrance fee of one shilling each to the Vidahu (the man who had been appointed by government specially to repress such breaches of the law), and he and a henchman of his seem to have held the stakes. It came out in evidence that the man who met his death in the gambling house had placed £20 in the hands of the Vidahu, depositing £8 with the other man. A witness questioned as to the possibility of such large sums changing hands amongst native gamblers, insisted that similar transactions were not uncommon. Be this as it may, the unfortunate gambler, who was excited by drink, asked for some of his money back, and not getting what he considered enough applied insulting terms to the Vidahu. The latter gave the order 'strike,' an order which his assistant readily obeyed, the man was seen to be violently kicked and beaten, and was heard to cry out 'Oh! I am lost!' a hand was seen to take hold of his throat, and then the lamps were overturned. In the darkness there can be no doubt the victim was strangled to death, the post mortem examination disclosing all the usual signs of strangulation, while such violence was used that the larynx was displaced. The Crown, as may be imagined, experienced great difficulty in obtaining evidence, and one of the witnesses had himself the charge of murder hanging over him. The jury, however, though they mercifully acquitted the prisoners of murder, had no hesitation in finding them guilty of manslaughter, a verdict in which the presiding judge said he fully agreed. Mr. Justice Lawson in passing sentence, dwelt on the peculiar atrocity of the conduct of the peace officer in systematically violating the laws he was appointed to enforce. As a warning to other head men an exemplary sentence was necessary. The Vidahu, therefore, would be punished by ten years' imprisonment with hard labor; his companion receiving a punishment lighter by one-half. The surprise and despair of the well-to-do prisoners, who had evidently calculated on an acquittal, were extreme, and we trust the moral effect in Minangodde and elsewhere will lead to much needed reformation. There can be no doubt that arrack drinking and gambling are at the root of much of the crime committed in Ceylon, and that the police, rural and regular, require, to say the very least, strict looking after."

In looking over the Administration Reports, for 1868, just issued, find there is no mention of intoxication or drunkenness. I subjoin the statement contained therein of the revenue, derived by

government, sold in the different provinces, to the arrack renters, viz. :—

PROVINCES.	1867-68.	1868-69.
Western,	£70,696 5s. 9¾d.	£63,986 5s. 10d.
Central,	49,800 0 0	48,505 0 0
North-Western,	10,823 8 0	12,393 14 7½
Northern,	3,963 0 0	3,629 0 0
Eastern,	4,230 10 0	4,057 6 8
Southern,	1,326 13 4	1,094 14 6
	£140,839 17s. 1¾d.	£133,666 1s. 7½d.
Total in American gold,	$681,664 88	$646,943 72

I have the honor to be, sir, with respect, your most obedient servant,

GEORGE W. PRESCOTT, *U. S. Commercial Agent.*

CONSULATE OF THE UNITED STATES OF AMERICA,
YEDO (TOKEI), JAPAN, July, 1870.

SIR:—Herein is the report of Dr. J. H. Kidder, U. S. Navy, to whom I referred your letter of February 23d.

Dr. Kidder has spent much time in studying the Japanese, their character and habits, and I take pleasure in forwarding his opinions, knowing them to be the intelligent result of careful investigation.

I am, sir, very respectfully, your obedient servant,

C. O. SHEPARD, *U. S. Consul.*

U. S. STORESHIP "IDAHO," 1ST RATE,
HARBOR OF YOKOHAMA, JAPAN, July 8th, 1870.

SIR:—I beg leave to acknowledge the receipt of your letter of June 28th, inclosing a communication (herewith returned) from Dr. Henry I. Bowditch, chairman of the State Board of Health of Massachusetts, which contains certain inquiries concerning the use and abuse of intoxicating liquors in Japan.

I take great pleasure in complying with your request and answering Dr. Bowditch's questions to the best of my ability, although the accuracy which he desires is not attainable in this country as yet, both on account of the peculiar light in which intoxication is looked upon in Japan, and the fact that it has not, so far as I can learn, ever been made the subject of official investigation.

1st. *Saki* is the generic name for all native intoxicating drinks. They agree in that they are all obtained by the distillation of rice, but differ greatly in strength and flavor, according to the degree of dilution and mode of manufacture. While some varieties resemble liqueurs, being of great strength, largely sweetened and highly flavored with aromatic herbs, others, equally intoxicating, are fiery, acrid and unpleasant to the taste, and others still (these the brands in common use), are largely diluted with water, mawkish and slightly nauseous in taste, and not more intoxicating to foreigners than ordinary draught ale or old cider. A specimen of this commoner sort, taken at random, I have found to contain about eleven per cent of alcohol. A brand of especial excellence, known as the Sho-gwats saki (New-Year's wine), and produced only at New-Year's calls, is in flavor and strength not unlike the common Rhine wines. The natives themselves are remarkably susceptible to the influence of saki, and show by flushed faces and excited bearing a marked degree of intoxication after drinking an amount which makes scarcely a perceptible impression upon foreigners. The cups in universal use for saki are exceedingly small, rarely holding so much as a fluid ounce.

2d. The amount of crime which can be directly traced to intoxication in this country is almost inappreciable, and this is due, as I think, to the following among other reasons: first, the mild and inoffensive type of the national character, which impels the people when drunk, rather to dancing, singing and displays of affection, than to combativeness; secondly, the great dilution of the ordinary qualities of saki, almost universally used; thirdly, the small size of the drinking cups mentioned above (perhaps this is rather effect than cause); and fourthly, the state of public opinion, which looks upon intoxication as a misfortune, a species of illness, and not as a legitimate mode of enjoyment, or subject of ridicule.

It is true, that occasionally one of the drunken *samourai* (class entitled to wear two swords) will on meeting with foreigners, actuated by his early prejudices and military training, draw his sword, and make an attack, which would have been refrained from had he been sober. But such instances are exceedingly rare, and when they do occur it is still more rare that mischief is not prevented by his perhaps equally drunk but less quarrelsome companions. During a residence of more than two years in Japan I have frequently been with the Japanese of the better and more dangerous class, at their convivial meetings, sometimes alone, and although they have generally ended by getting tolerably drunk, I have never seen swords drawn, or any exhibition of ill-temper or malice. Twice in

the streets of the native cities I have seen drunken Japanese officers attempt to draw their swords upon foreigners, but in neither case did any ill-result follow, their friends interfering almost before the action could be noticed. Quarrels among themselves caused by drinking are exceedingly rare. As for other kinds of crime, I have yet to hear of the first instance of a connection between such and drunkenness.

Like all Eastern nations the Japanese are exceedingly temperate. Habitual drunkenness is almost unknown. At the general holidays, which occur about forty times a year, and at private family festivals, all the natives, men, women and children, drink more or less saki, but at other times they rarely touch it. Saki is brought out at the family festivals, is drunk with great ceremony at funerals, and on special occasions of jollity, but is rarely allowed to interfere with business or labor. Last month there was an unusually important *Matzri* (festival) at Yokohama, to the Goddess of Heaven, the ancestress of the Mikado dynasty. This holiday lasted for three days, during which it is safe to say that the entire native population of Yokohama was more or less intoxicated. The streets were crowded with processions and shouting bands of men with flushed faces, capering, singing and playing practical jokes. With all this drunkenness, there was not a single instance of assault, much less murder, reported. Comparing this result with that of a 4th of July in America, or with similar holidays in other countries, I cannot hesitate in declaring that not only is the comparative intoxication of this country less in degree than that of other nations, but that it differs in kind, leading to few or none of the evils to society which have caused the temperance movement at home.

Since the government has never recognized drinking as a cause of crime, or as a greater evil than any other excess, it has never been made the subject of official investigation, and there are therefore no official statistics.

I am sir, very respectfully yours,

J. H. KIDDER, A. M., M. D.,
Asst. Surgeon U. S. Navy.

C. O. SHEPARD, Esq., *U. S. Consul*, Tokei, Japan.

UNITED STATES OF AMERICA LEGATION,
YOKOHAMA, JAPAN, June 20, 1870.

DEAR SIR:—Your communication of the 23d of February, 1870, propounding the following inquiries, to wit:—

1st. "What are the chief intoxicating articles used in Japan?"

2d. "What amount of crime is produced by them, and their

effects on health and prosperity of the people?" and also, asking my opinion as to the relative amount of intoxication in this country, &c., is now before me.

In reply to question No. 1, my answer is Saki, a liquor brewed from rice.

In answer to the second question, having no statistics to guide me, I can only answer it relatively by saying: less crime resulting from intoxication occurs here than any other country I ever was in, and less evil effects upon the health and prosperity of the people from this cause is observable than in the United States.

This is not a country in which any statistics in regard to this matter are obtainable, but after receiving your letter, I conferred upon the subject with a number of gentlemen of long residence here, and close observation, and from them I learned that their convictions coincided with my own as already stated, and as follows, to wit: The free use of intoxicating drinks is allowed all classes of Japanese people by law, the original object of allowing which was to prevent their resorting to the use of opium as the Chinese do, and it succeeded, as opium is not used by this people. Secondly,—the people are rigidly and by birthright divided into castes, the upper class or Samourai commencing with the Emperor, concludes with the private soldier, all of whom constantly wear swords and never perform manual labor. The second class includes farmers, mechanics, merchants, and thus on down to Coolies, in the order here stated. They perform all the labor of the country, are not eligible to any office, and hold their lives and property by a very delicate thread that this upper class stand upon little ceremony in severing, if sufficient excuse is offered; hence this lower class, from sheer fear of offending some of the Samourai, and meeting with severe and summary punishment, are not addicted to drunkenness, in which condition they would be most liable to do or say something that would bring punishment upon them. Any member of the Samourai class, although but a private soldier, is eligible to any office in the gift of the Emperor, and generally all offices are filled by men promoted for their skill or wisdom. To be known to be addicted to drink, or even to be seen once intoxicated, would have the effect to seriously diminish the chances of one's promotion, and as they are generally an ambitious and aspiring people they avoid this evil in aid of their ambitions, and besides this as they rarely quarrel without fighting, and as all of them go constantly armed with most formidable weapons, they avoid drink as likely to produce fighting, and fighting with them means the death of one or the other of the antagonists. Thus sobriety is the rule and intoxi-

cation the rare exception with this people. My Secretary, Mr. A. L. C. Portman, who has been a constant resident here now some ten years, and has mixed very much with all classes of the people, assures me that Japanese women make no use of intoxicating liquors at all, and that he has during his whole residence never seen but one Japanese woman under the influence of liquor. Regretting that I am unable to furnish you with any statistical information as requested, and apologizing for the meagreness of the information hereby given,

I remain, yours most truly, C. E. DeLong.

P. S. Since writing the foregoing I have met and conferred upon the subject with Doctor Hepburn, a missionary gentleman and a physician here of the highest repute, who has lived here a long time, keeps a dispensary, and has many Japanese patients, and from him I learn that drinking is much more frequent than I supposed amongst the Japanese, who as he says quietly drink at home very considerably, both men and women, but as the intoxicating qualities of Saki are only about equal to lager-bier, it is used almost as a beverage, and but little evil consequences comparatively speaking are produced by its use. This information I deem most reliable and therefore send it with my own views.

Yours, respectfully, DeLong.

AGENCY AND CONSULATE-GENERAL OF THE U. S. OF A. IN EGYPT,
ALEXANDRIA, July 25, 1870.

DEAR SIR:—Your queries in behalf of the State Board of Health, regarding the influence of intoxicating drinks on the health and prosperity of our people, addressed to me at Calcutta, have been received in Egypt, to which country my government was pleased to transfer me.

I will, however, cheerfully answer the questions to the extent of my ability.

1st. The chief intoxicating articles are, "arrack," champagne and red wines.

This being a Mohammedan country, drunkenness is almost unknown, and confined entirely to the foreign Christians residing here.

2d. Crime is almost entirely committed by the foreign population and altogether so when it is caused by drunkenness. Murder, theft, rape, burglary, forgery and other grave crimes are monopolized by the Greeks, Italians, French and other Christians resident in Alexandria and Cairo.

Of course, under these circumstances there can be no relative amount of intoxication between the two countries. In the United States and England, the capacity to hold a vast quantity of liquor is taught as one of the highest attributes of manhood. In this benighted land, to be drunk involves the most extreme social and religious disgrace. And while the teachings of the Prophet hold sway, there is no prospect of these infidels becoming civilized in that respect.

3d. There are no statistics of intoxication and crime in this country; the records from the Christian nations will therefore have to furnish warnings to the good people of the grand old Commonwealth of Massachusetts which in matter of temperance may proudly say she is almost Mohammedan.

I remain, with the highest respect, your obedient servant,

GEORGE H. BUTLER.

CONSULATE OF THE U. S., ISLAND OF ZANZIBAR,
May 21, 1870.

DEAR SIR:—I received on the 18th inst., your letter of February 23, 1870, asking information as to,—1st. What are the intoxicating articles used in Muscat? In several visits to that place I have never heard of or seen anything of the kind, but once, on which occasion a vessel arrived from Mauritius with about sixty casks of rum. At Zanzibar the Arabs drink German gin and French cognac of the vilest description, and the negroes cocoanut rum of their own manufacture. 2d. What amount of crime is produced by them, and their effects on the health and prosperity of the place?

As the religion of the people is Mahometan, which forbids the use of intoxicating drinks, those who use them do so in secret, taking care to confine their appetites within bounds so as to retain the outward respect of each other, and we only see drunkenness when English or American sailors are on shore here. No comparison therefore is possible between the two countries. I believe that intoxication seldom if ever, leads to crime in these dominions.

I am, sir, very respectfully yours,

FRANCIS R. WEBB, *U. S. Consul.*

UNITED STATES CONSULATE, CAPE HAYTIEN,
July 1, 1870.

DEAR SIR:—I have to acknowledge your circular of February 23, which reached me only on the 14th June, and I have now the pleasure to reply to it.

Before entering however upon the proposed questions, I find it necessary to make a few preliminary observations. Intoxication by ardent drinks and other narcotic drugs, alike with smoking, as a general vice, presupposes an advanced state of society, when men strive to forget the realities and hardships of life by over-exciting their nervous system. For, the proper use of drinks is, to quench thirst; and for this purpose, nature has afforded to man, one of her richest and most abundant gifts, the limpid, cooling and enticing draught of springs, wells and rivers, which abound nowhere more than in the West Indies.

The masses of pure African descent in Hayti are a semi-civilized race, of the simplest tastes and habits; their wants are few and amply provided for by the fertility of the soil, their undisputed property. As a general rule they have rather an abhorrence for strong drinks, to the use of which only habit and social intercourse lead. Living isolated in their mountain fastnesses, and in no or little contact with foreigners, nor even with the inhabitants of the ports, the habit of convivial meetings lacks encouragement.

To reply to query 1, the chief intoxicating drink of Hayti is cane-spirit, called here "Tafia." At the time of French colonial rule until Christophe, cane sirup was only used for the production of sugar; distilleries for the production of spirits were scarce. Since the independence of the island and the cessation of sugar boiling, most of the sirup goes to the distilleries (guldives), which were then established in districts favorable to that particular industry, and "tafia" became the general stimulant drink.

But the character of the masses and the paucity of the "guldives" over a vast area of inhabited plains and hills, the constant repetition of civil contests almost in every decennium, interrupting and ruining industrial enterprise, prevented the development of the propensity among the masses. The chief consumption remained confined at the seaport towns to sailors, foreigners and such Haytien half-breeds who had visited Europe and imported European habits. Under the late government of Salnave, the commodity became so scarce that a law was passed to import foreign rum, free of duty, I suppose under the then circumstances of the country, with very small results.

Query 2d. Hence there may be, though rarely, drunken fray between sailors and other habitual tipplers, but within my knowledge, I never heard of the committal of any serious crime by negroes in consequence of immoderate drinking.

Polydipsia and inebriety, as effects of a morbid state of health such as hypochondriasis, hysteria, &c., are, in a country where

norals and sexual intercourse are unrestrained, almost unknown. On the other side, diseases consequent on immoderate use of ardent iquors, such as dropsy, scirrhus ventriculi, delirium tremens, consumption, are of rare occurrence among Creoles. The general ealth is favorable, when compared with other similarly constituted ountries. Cholera never touched these shores, whilst desolating lmost all the surrounding islands.

In spite of the political turbulence since the liberation from rench rule, the people live at ease, and generally prosper. Statisical accounts in a country where the population are from time to ime decimated by civil war, and an organized administration is mpracticable, are out of question. I shall however endeavor to ollect materials in my district, where I am only a short time ocated, for further communication.

I remain, very respectfully yours,

ABM. CROSSWELL, *U. S. Vice-Consul.*

LEGATION OF THE U. S. A., NICARAGUA, LEON, May 15, 1870.

DEAR SIR:—I regret that, in reply to your letter of February 3d last, received the 1st instant, I am unable to furnish you with ny statistics or definite information on the interesting subject lluded to therein.

As in all Spanish-American countries, so in Nicaragua, the govrnment has monopolized for itself the sale of strong liquors. The rticle almost exclusively used by the mass of the people is rum, ade of sugar-cane, sold and drunk perfectly pure and unadulterted. The higher classes indulge in the vilest stuff imaginable, imorted mostly from France as cognac, champagne, &c., &c.

There are remarkably few cases of drunkenness noticeable in ublic and among the lower classes, who drink rum, while, for good asons, I always found it wise on occasion of banquets, dinner or her parties, both public and private, among the higher classes, to thdraw at an early hour. If the native rum, which seems but exceptional cases to be indulged in to excess, has any injurious ect on the health and prosperity of the people, which I am ther inclined to doubt, it certainly is very insignificant.

During a residence of nearly seven years in Central America osta Rica and Nicaragua), I do not think that half a dozen of fortunates, bent upon self-destruction by strong drinks, among e natives, have fallen under my observation.

I am most confident that the amount of intoxication in this coun-

try falls immensely short of that seen and not seen in our own land. Even here, I regret to say, our countrymen are by no means distinguished for sobriety.

I have heard it asserted, both in Costa Rica and here, that delirium tremens is never the consequence of excessive indulgence in rum, but will inevitably follow as soon as the rum-drinker turns to foreign, i. e., European and American strong liquors.

I have the honor, sir, to be your obedient servant,

C. N. RIOTTE.

U. S. CONSULATE, ST. CROIX, W. I.,
June 13, 1870.

SIR:—Yours of February 23d has been received. In answer to your first question, I would inform you that the "chief intoxicating articles used in Santa Cruz," are rum, brandy, wines and malt liquors, all of which, except the rum, are imported from Europe. The rum is manufactured here, and is the almost only intoxicating drink used by the laboring population. The higher classes only use wines and malt liquors, and brandy more than rum.

It is impossible for me to answer your second question with any degree of satisfaction, as there are no statistics on this subject published here. Crime of a serious character is very uncommon. Pilfering produces most of the tenants of our prisons, and I believe there is no country in the world where one is safer from assault and robbery than in the island of Santa Cruz. This results, doubtless, in some measure, from our isolated position and the difficulty of escape. "Rum-shops" are abundant, and rum is sold at them in any quantity down to one cent's worth. Still I am of opinion that drunkenness is less common with the laboring classes than in the United States. An exhibition of it in the streets is certainly less common. This, however, may be owing in part to police regulations and the fear of arrest. I think the effect of the use of intoxicating drinks is more apparent among the higher classes. Wines and liquors are used at all social gatherings very freely, and by a considerable number of the people at all times too freely. That the effect is pernicious to health, and injurious to the prosperity of those who thus indulge their appetites, I know from personal observation. I do not think, however, any amount of crime is produced by the use of spirituous liquors. Upon the whole, I am inclined to the opinion that the use of intoxicating drinks is much more *universal* here than with us, and that intemperate drinking

is more common among the higher, and less common among the lower classes than in the United States.

I am, sir, with great respect, your obedient servant,

E. H. PERKINS, *U. S. Consul.*

TORONTO, ONTARIO, April 17th, 1870.

I have to acknowledge the receipt of your communication bearing date 23d February, 1870, and, in reply, briefly give you such information as seems to me pertinent to the subject you have under advisement.

In reply to your first inquiry, "*What are the chief intoxicating articles used in Canada?*" I answer, that brandy, gin, whiskey, sherry, champagne, together with the various kinds of ale and beer, make up, in the main, the list of "intoxicating articles" used in Canada.

In answer to your second inquiry, "*What amount of crime is produced by them, and their effects on health and prosperity of the people?*" I have to report that, in my judgment, founded on large observation, *ninety-eight per cent.* of all the crimes committed here grow out of the use of intoxicating drinks. In the police court of this city the daily arrests vary from five to twenty. I have very frequently visited the same, and I do not now recollect a single committal to have been ordered, or a fine imposed, since I came here, where the prisoner was a consistent temperance man or woman. Intemperance *almost invariably* lies at the bottom of all the crimes which swell the criminal calendar of this city and entire Province.

As to the relative amount of intoxication in Canada and that seen in the United States, I may say that it would be difficult to determine what ratio there was between the two countries, owing to the difference in the quality of the intoxicating drinks used. In Canada, as a general rule, liquors are cheaper and purer than in the States, and as a consequence more can be used with less apparent injurious effect here, than would be possible there.

Pure liquors do not affect the habitual drinker as do the vile compounds sold in such alarming quantities in the United States. There is a marked difference in the effect produced by pure and drugged liquors. In the one case, the effect is the reverse of the other. One using drugged liquors seems to be for the time in a state of frenzied insanity.

The general use of wines and liquors in Canada, as a social

custom, is in marked contrast to the growing abstinence in many of the leading families in the States.

Intemperance here, as is the case everywhere, breeds crime, and daily leads to the committal of monstrous wrongs. The subject you have in hand is one of very great importance to society the world over, and I am sincerely sorry that pressing duties will not permit me to more fully develop an inquiry almost boundless in its bearings.

Sympathizing most fully as I do in your researches, as set forth in the circular you forwarded me, I shall look with interest to the results of your labor. The social problems of the day are the great questions of the age, and he who succeeds in providing a practical remedy for the evils now threatening the future prosperity of our body politic, will earn for himself the commendation of all mankind.

Faithfully yours,

A. D. SHAW, *U. S. Consul.*

UNITED STATES CONSULATE, TRINIDAD DE CUBA,
April 11, 1870.

SIR:—On the ninth instant I had the honor to receive your communication dated February 23d, requesting information toward elucidating the subject of the "influence of intoxicating drinks on the health and prosperity of the people of the United States," and I cheerfully give you the little information which I possess in behalf of a subject of so great an importance.

With regard to question 1st, "What are the chief intoxicating articles used in Trinidad or vicinity?" I would reply, that the usual intoxicating drink made use of here is called "aguardiente;" it is distilled from molasses, is sold at a cheap rate, and is made free use of, not only for drinking, but also for bathing.

This liquor, although used so freely as a drink by the poorer class of whites, and the blacks, yet I must in justice add, that notwithstanding its liberal use, it is very seldom that it is drank to excess so much so, that it is an extremely rare thing to see a person intoxicated in the streets.

The cheap claret wine from Spain (principally from Catalonia) is made use of here very generally at meal times, but scarcely ever is drank to cause intoxication. Indeed, it is a fact which has often attracted my attention, that in a country where intoxicating drinks are to be had so cheaply as to be within the reach of every one, and I may say, in such general use, that so very few cases of drunkenness are seen. This, I conclude, is in part owing to the fact that a

abitual drunkard is looked upon by these people with disgust and ontempt. One may be a gambler (and there are a hundred of them o one habitual drunkard), or anything else immoral and improper, nd this will not deprive him of a respectable position in society, hilst to be a drunkard is almost an unpardonable sin.

With regard to question 2d, "What amount of crime is produced om the use of intoxicating drinks, and the effects on health and rosperity of the people?" would say, that really in this town, where have resided for thirty years, the amount of crime proceeding irectly from the use of intoxicating drinks is so small that I can fely say that it does not amount to one per cent. of the total of imes from all causes. Consequently I may say that the "prosperity" f the inhabitants is scarcely affected, if at all, from the effects of ntoxicating drinks. I would add that a large number of coolies ave been imported into this island, and that they are much addicted o the use of opium; this is the cause of the death of many of the oolies, and also, under its influence, or from its effects, they commit any crimes, and I have no hesitation in saying that there are fifty eaths among the coolies from the effect of opium, to one amongst he creoles from that of intoxicating drinks.

With regard to the "relative amount of intoxication in this town ompared to that seen in the United States," you may well infer om the foregoing that the latter country must suffer most lamentbly from the comparison. It is impossible for me to remit any official statistics of the amount of intoxication and crime resulting erefrom," as you request, as no such records have ever been kept re to my knowledge.

In conclusion, would say that I wish to be understood as referring this city (Trinidad de Cuba) exclusively in the foregoing observans, and with my best wishes for your cause,

I remain, your obedient servant,

HORATIO FOX, *Consul.*

LEGATION OF THE UNITED STATES OF AMERICA,
LIMA, PERU, May 22d, 1870.

DEAR SIR:—I have the honor of acknowledging the receipt of ur letter, dated the 23d of February last, inquiring, 1st, "What e the chief intoxicating articles used in Peru?" and

2d, "What amount of crime is produced by them, and their effects health and prosperity of the people?"

In answer to the first question, I may briefly say that all kinds of uropean liquors and wines are used in Peru. To those may be

added "Italia" and "Pisco," Peruvian brandies, made from the grape, "Chicha," made from maize, and similar in taste and character to the beer in our whiskey distilleries after the fermentation.

The wines of the country are very fair, but still the higher classes mostly use foreign importations, and at their tables, Bordeaux, sherry, and on special occasions champagne, will be found.

Your second inquiry is more difficult to answer. As a people, the Peruvians are much more pacific than our own, and crime is not so common. After six years' residence in Lima, a city containing 180,000 inhabitants, I have only seen one assault and battery—only four or five homicides have been committed, and pickpockets are unknown. The newspapers also show that such occurrences are very rare.

The Peruvians are far less given to drunkenness than the people of the United States. Among gentlemen such offences are of rare occurrence, and foreigners certainly excel them in all such "gentlemanly vices."

As to the health of the people, I can only state that I believe the average age of adults in Lima far exceeds that in the United States. From appearances, it would not be difficult to find in Lima at least one hundred persons over one hundred years of age.

Temperance societies are unknown here, and all drink who have the means to pay for it. My impressions are, that the use of light wines, and "Chicha," in this climate, add to the cause of temperance and health, by banishing the stronger alcoholic beverages and giving tone to the stomach and circulation of the blood. Life here seems to me torpid, and stimulants necessary.

As there are no statistics of intoxication and crime, except as stated in the daily journals, I regret that my reply to your note could not be more thorough and satisfactory.

I have the honor to be, your obedient servant,

ALVIN P. HOVEY,

Envoy Extraordinary and Minister Plenipotentiary of the United States of America to Peru.

PARA, 23d May, 1870.

DEAR SIR:—I am in receipt of your communication of 23d Feb. illness has prevented my replying to it sooner.

1st. The chief intoxicating article used in Brazil is "Cachaça," rum (made from the sugar cane).

2d. In the absence of statistics, it is impossible to give a satisfactory reply to your second interrogatory, but habitual intoxication

is rare in Brazil, and is, I may say (of course with individual exceptions), limited to the lowest class of the population. Even among these it cannot be said to be prevalent. The blacks will get drunk sometimes, but even among them the vice is not general. Our country population, the Sapuyos or civilized Indians, are as a rule temperate, but they will all get drunk on certain "festas" (Church holidays), when they gather from miles around at the district chapel.

You will observe that my observations apply more particularly to the Amazonian provinces, but I have resided in the south as well as in the north of Brazil, and with exception of the reference to the Sapuyo, a race found only on the Amazon, I believe they may be applicable to the country generally.

The word "bebado," drunkard, is a term of great reproach—in the cities, it is too often and too justly connected with the word "Inglez," and I am sorry to say that the national designation properly includes our own countrymen.

A great deal of porter and ale is consumed in the country, imported from England.

There is a festa held yearly at a chapel in the suburbs of this city; last year, on the principal night, when I think not less than from 10 to 15,000 people of all classes were assembled in the square, I passed through the crowd, and observing carefully, could not find one drunken man; nor was there any *row* nor any fight; later in the evening two drunken men appeared, both *respectable* foreigners.

With these exceptions, I do not remember to have seen more than two men (one a slave) drunk in the streets during the past six months.

You will see from these remarks that no comparison can be made as to the amount of intoxication in this country, and the extent of the national vice which so sadly disfigures our own.

Very respectfully, your obedient,

JAMES R. BOND, *United States Consul.*

It is proper, that I should add, that the consumption of "cachaça" is large,—there is a grog-shop at almost every corner, not limited however to sale of liquors. How it happens that there are so many moderate drinkers and so little drunkenness I cannot tell.

CONSULATE OF THE UNITED STATES OF AMERICA,
AT PERNAMBUCO, July 1st, 1870.

DEAR SIR:—I have the honor to reply to your inquiries as far as I can gather them, viz:—

The chief intoxicating drink of this city and province, is the

liquor distilled from the sirup of sugar-cane, commonly called canœ, or Brazil rum; there is quite a large quantity of it distilled in this province, but it is not all consumed here; a considerable quantity of it is exported to the south.

Most of the natives drink this, particularly the lower classes, as it is cheap, the cost being about forty cents per gallon. The crime that is produced from this drink, so far as I can learn, is very small. A person may travel through the streets of this city, for a week, and in fact the province (I have travelled much through it), and not see a Brazilian intoxicated.

Most of the crime that is committed through the influence of strong drink is by foreigners, principally seamen, and that only trifling cases of assault and battery.

Most of the foreigners that reside here are English, German and French. The English and Germans drink more or less beer, which is mostly imported from Europe. Many of the English drink brandy, and other intoxicating drinks, which has a bad effect in this hot climate, producing fever, and often death with the continued use of strong drink and exposure; although this is a healthy port, and clear of all contagious diseases, and has been since I came here, and for several years past, as I have learned.

I think the use of rum, or ardent spirits, is no detriment to the prosperity of the people, as they do not use it yet to excess, but the use of it is increasing, and may in time reach to bad results, as the manufacture of it increases yearly.

The most of the crime committed here is caused from jealousy and revenge, and done in cool blood; not intoxicated, hot and angry with spirit as in our country, but premeditated and cool; mostly of a dangerous character.

I have known several persons stabbed since I have been here, from jealousy, which is the cause of most of the capital crimes that are committed; not from drinking spirit but in the coolest manner, by attacking the party unsuspected and dealing a dangerous blow.

As to the amount of intoxication between this country and ours, there is no comparison, for here you seldom see a drunken man.

I came from the city of Philadelphia, where most of the crime is caused by intoxication, or the effects of it, and here none comparatively, so little that it caused me to make close observations as to its effects on the habits of the people. As for statistics of crime on account of drunkenness, I think there are none, at least in this city that I can find; if there is any crime from intoxication it is recorded from other causes.

I hope the above will be satisfactory, as it embraces most of the facts, as near as I can gather them from observations and statistics.

I am sir, with the greatest respect, your obdt. servant,

SAMUEL G. MOFFITT, *U. S. Consul.*

U. S. CONSULATE, SAN JUAN DEL SUR. Now at CORINTO, May 27th, 1870.

DEAR SIR:—Yours of February 23d is received, and I cheerfully give you such answers to your questions as I am able. I should say, however, that my facilities are not good for getting accurate information on the subject in question, as my business confines me the greater part of the time at this port, a town of small population.

The *chief*, and almost the only intoxicating drink used by the *masses* of the people in this Republic is *new rum*, manufactured from cane molasses. It is a government monopoly, made by contract, at about forty-five cents per gallon, and sold by the government for $2. From this it derives an important revenue. The wealthier classes use cheap brandy. Claret wine is used quite generally, and I think a considerable amount of other wines, among those who can afford it.

No *statistics* of crime can be obtained resulting from this or other causes, but my impression is that intoxication here gives about the same proclivity to vice as elsewhere.

There are *very* few people here who are strictly temperate and very few who can be called inebriates, but I am quite positive that there is far less intoxication here than in the United States, and vastly less evil resulting therefrom. My opportunities for *general* observation in neither country would qualify me for giving a reliable statement of the relative amounts.

I am sir, very respectfully yours,

RUFUS MEAD, *U. S. Consul.*

CONSULATE OF THE UNITED STATES OF AMERICA, TRIESTE, October 13th, 1870.

DEAR SIR:—Some months since I had the honor to receive from you a circular letter requesting information upon the influence of intoxicating drinks on the health and prosperity of the people under my daily observation, your inquiries being given under two general heads, to which I will reply after a preliminary remark or two.

Trieste (proper) contains a population in round numbers of about 90,000 souls. It is not only the principal seat of commerce

on the Adriatic, but of a large manufacturing industry. It has extensive iron-works, large ship-building establishments, and a great number of coopers' and cabinet-makers' shops. The want of dock and wharf accommodations, and of machinery for the manipulations of its immense grain and lumber commerce compels the employment of a very large number of lighter-men and laborers, not needed in American ports. Again there are rarely less than a hundred vessels in port—not counting of course, fishing smacks and the like, and I have known the number to reach 430. The arrivals of sailing vessels in 1869 were in number 7,376, of which 1,725 were from ports outside the Adriatic; arrivals of steamships 1,719, more than two-thirds of which were from ports outside the Adriatic—mostly large vessels of 800 to 2,000 tons. We have, therefore, seldom less than 500, often 2,000 or more seamen in port. No English or American (Atlantic) sea-port has so large a number of laboring men in proportion to the whole population, as Trieste. As boarding-houses (in the American sense of the term) are unknown, the unmarried and a large proportion of the married men collect in the eating-houses for their supper, when the day's work is ended, and are thus exposed constantly to the temptation to indulge in strong drink.

The "liquoristas" scattered through the town to the number of seventy-eight, correspond to the old American "bar-rooms," except that they are not connected with the inns. They are independent shops and furnished in all degrees of elegance. All sorts of liquors and high-priced foreign wines are sold by the glass in those of the higher class, ordinary liquors only in the lowest, but no common wines or beer. How these liquoristas exist is a mystery to me, for in the many I pass daily, I seldom see more than three or four persons, and the gulping down of glass after glass of brandy, gin or rum is utterly unknown among the native population. The glasses used are exceedingly small, and the liquor, usually unmixed with water, is sipped slowly at intervals, as a gentleman with us takes his maraschino after dinner. Mixtures like "juleps," "cobblers," and the other wonders described by English tourists in the United States, are unknown.

The "Osterias," one hundred and eighteen in number, are the ordinary eating-houses of the middle and lower classes of the people. In them, as a rule, I believe without exception, no drink but wine is to be obtained; the light red and white wines from neighboring districts, drawn from the casks.

The "Trattonas" and "Birrarias," restaurants and beer-houses, rank higher than the last, and are in the main supported by the

ercantile class, the officers of the army and navy, and generally ie Teutonic in contra-distinction to the Italian and Sclavonic pop- ation. Beer is the principal beverage in these fifty-five establish- ents, though wines are also furnished, and the occasional demand r a small glass of cognac or other fine liquor is supplied.

In the fifty-four coffee-houses also, all the finer liquors and spirits e dispensed, but invariably in the smallest of "portions."

In the hotels are no bar-rooms, but the guest is supplied, at table in his room, with whatever beverage, from beer to brandy, he ay demand.

It will be seen from the above that no restraint whatever is im- osed upon the purchase of spirituous liquors, except that in the censes granted to the lower classes of eating-houses, the proprie- ors are deprived of the power of tempting to drunkenness by the le of anything except wines or beer.

The following tables, drawn from the very exact records of the Chamber of Commerce, will give a fair view of the consumption of eer, wines and liquors by this population of 90,000. Everything f the kind that enters the city by sea or land is recorded in "cent- er," hundred weights.

YEARS.	Imports by sea and land of Alcohol and Spirits, Rum excepted, cwt.	Exports, cwt.	Excess of Imports, cwt.	Imports of Rum, cwt.	Exports of Rum, cwt.	Excess of Export, cwt.
60, . . .	190,950	171,802	19,148	9,374	33,440	24,066
61, . . .	163,829	140,515	23,314	12,224	29,946	17,722
62, . . .	156,364	110,613	45,749	10,997	32,976	21,999
63, . . .	159,150	139,260	19,890	2,657	33,367	30,680
64, . . .	209,574	182,988	26,587	5,275	39,466	34,181
65, . . .	199,079	171,060	28,019	4,225	39,476	35,251
66, . . .	181,872	160,988	20,884	6,754	32,056	25,302
67, . . .	179,890	163,805	16,085	2,668	31,636	28,968
68, . . .	256,588	226,108	29,171	7,538	43,681	36,143
69, . . .	274,239	224,230	46,431	1,340	60,982	59,642
	–	–	275,278	–	–	313,954
Excess of Export, ...						38,675

There are no distilleries in Trieste; making due allowance, there- re, for the ordinary consumption of alcohol in manufactures, the eat excess of the export of the mixture here called "rum" over e import of the real article, reduces the amount of spirits used as

a beverage to an exceedingly small quantity. That is to say, statistics, also, prove that spirits are in no form a common drink of any class of people in this city.

Total Imports and Exports by Sea and Land.

YEARS.	WINE.			BEER.		
	Imports, cwt.	Exports, cwt.	Excess of Import, cwt.	Import by land, cwt.	Export by sea, cwt.	Excess of Import, cwt.
1860, . .	173,976	47,237	126,739	71,475	21,958	49,517
1861, . .	106,599	47,791	58,808	82,520	28,094	54,426
1862, . .	137,421	30,395	107,026	84,081	32,207	51,874
1863, . .	176,028	30,514	145,514	72,924	29,025	43,899
1864, . .	180,045	33,139	146,906	72,704	29,920	42,784
1865, . .	183,781	36,414	147,367	84,978	40,167	44,811
1866, . .	214,030	30,198	183,832	73,879	51,273	22,606
1867, . .	192,854	37,009	155,845	93,614	48,669	44,945
1868, . .	194,525	44,738	149,787	113,856	68,413	45,443
1869, . .	208,667	60,449	148,218	137,028	71,377	65,651

[N. B. The discrepancy in the beer statistics for 1866 is caused by the opening of a splendid new brewery, just back of the town, in the spring of that year, the product of which does not appear in the figures that season, except partly in the column of export.]

These tables and the preceding remarks afford a full answer to query 1 of your circular, viz.: that wines are the chief intoxicating article used in this part of Austria. So far as my observation extends, no person intoxicates himself on beer, and very few, if any, upon spirits.

As to the second question, "What amount of crime is produced by intoxicating liquors?" I have to report that no statistics bearing on this point have been kept at the police office, and that a police commissioner with whom I conversed on the subject is of opinion that the amount of crime directly traceable to the use of liquor is trifling, if any. The few drunken brawls, which arise in the course of the year, and cause arrests for assault and battery, are for the most part confined to the crews of *American* and *English* vessels.

The drinking of wine and beer is universal. Oil is used in cooking and at table in great quantity, but very little vinegar; and light, sour table wines are the corrective. From infancy to age they are the common beverage, but are generally, as by Homer's heroes, mixed with water.

As I have been home but once (1863), and then only for a period

eeks, since 1858, I am not competent to offer an opinion
mparative amount of intoxication here and there. I
ay that at that time, the American bar-rooms in New
hington and Boston, so frequented by respectably dressed
especially young men evidently of the better classes of
ring down spirits of all sorts, caused me a feeling which
describe as one of horror.

Trieste, on the evenings of Saturdays and holidays, one
retty large number of the laboring class of people in-
ut they are always "jolly drunk," not "savage drunk,"
w a broad distinction. They make night hideous in the
g-houses and occasionally in the streets, by the unearth-
hich they suppose to be singing, and wordy wars are
ent,—though even in this a stranger easily mistakes—
moment he expects to see a blow, he hears a burst of
Addison wrote 170 years ago of the Italian recitative—
en seen our audiences extremely mistaken as to what
ing upon the stage, and expecting to see the hero knock
essenger, when he has been asking him a question; or
at he quarrels with his friend, when he only bids him
w." On Saturday and Sunday evenings the laboring
with wives and children, sup together, as before re-
the public house, drink wines at a cost of less than 60
) per gallon, to various degrees of intoxication, reel
rted by wife or friend, sleep off the effects, and next
to work as usual. Getting savagely drunk and going
use and beat wife and children, is something unknown

to the better classes of society, I have to remark that
is known of a merchant, lawyer, physician, shop-keeper
nechanic, becoming an inebriate and gradually losing
roperty and business, and sinking into a drunkard's
at is to say, among the native population; for there
hree or four instances of Englishmen becoming more or
ed sots. One remarkable case of a man who sank so
ll his wife's and children's clothing for spirits, who be-
ance to the family into which he married, and to the
reeled about the streets, lay in the gutters, and at last
common hospital at Naples, may be mentioned. He
erican.

e no official statistics of the "amount of intoxication
e resulting therefrom" obtainable for Trieste; but upon
n of my observations here during the last six years,

with my recollections of those made between 1840 and 1850 at Cambridge and Boston, I should consider it a most happy change could the spirit drinking of Boston be bartered for the wine and beer drinking of this city. As I rarely taste anything intoxicating, I am in so far a disinterested witness.

I am, sir, very respectfully, your obedient servant,

(Signed,) ALEXANDER W. THAYER, *U. S. Consul.*

N. B. I find an omission in connection with the tables, viz., that the "centner" of export is the hundred-weight of Vienna; that of import the hundred-weight of the customs. The former is twelve per centum greater than the latter.

The following interesting letter is from the venerable Dr. Christison of Edinburgh:—

EDINBURGH, 26 July, 1870.

DEAR SIR:—When your letter of 23d February arrived here, requesting information about drunkenness in Scotland, I was confined by illness, and for some weeks in order to keep my University work going it was necessary for me to take great care by avoiding and postponing as much as possible of my other rather manifold duties. Thus it happened that I had to delay replying to your letter, until my undischarged debt to you has been brought up before me by the accidental discovery of the letter, and an unfinished answer, this morning. I fear the information I have to give you may be too late for any practical use you might have intended to put it to. But nevertheless I must not let you go on supposing, as you were well entitled to do, that I have been utterly regardless of your request.

I have several times bethought me how I could best give you a clear idea of the extent and evil effects of excess in the use of stimulants among my fellow-countrymen. The conclusion I have come to is to discard the favorite statistical method of inquiry among modern enthusiasts, as being full of fallacy, and apt to lead to dangerous and blundering practical conclusions. I am sure that you and your friends of the Massachusetts Board of Health will come much nearer the truth of things, if I tell you the general result of the observation of a long life, during which my attention has been seldom long withdrawn from the evils of drunkenness in various branches of the population of Scotland. There are really no statistical returns on the subject which are worth their cost in paper and ink.

In the first place, you ask "What is the chief intoxicating liquor used in Scotland?" The foremost is whiskey; the next is whiskey; the third is still whiskey; and any other is "nowhere," in racing phraseology. When the vice of drunkenness commences in any one of the middle or upper walks of life, wine may set it agoing; but that vehicle is soon changed to brandy, or to whiskey. Among the working classes there is no other from first to last than whiskey. Beer, a common intoxicating liquor among Englishmen, is not in use as such in Scotland. In the middle and upper ranks it is very widely used in moderation as a beverage during dinner, when wine is not taken. Scottish workmen unfortunately use it extremely little in that way, but, if they take any stimulant dietetically, it is whiskey; and hence the passage to excess is too easy. I do not recollect in fact to have ever seen a beer-drunk Scotsman but once; and that was an unfortunate gentleman of high reputation in a learned profession, who gradually fell into "rambles" of continuous drinking, and who, on one of these occasions, when the ladies of his house in the country had carefully locked up every bottle of strong drink they could think of, ferreted out, and got drunk upon, nine bottles of the smallest of small beer.

During last century the habit of frequent and extreme intoxication prevailed very much in all ranks of life. When one regards indeed what has been handed down of the correlative practices of the day, it is scarcely possible to avoid the conclusion that the upper and middle ranks, and even the educated and professional in the community carried off the palm in prowess as well as in frequency of indulgence. The close of last, and beginning of the present century saw a gradual change set in for the better. But even in my young days, when I began to go into company, about 1820, drunkenness in good society was far from uncommon. Almost any party of gentlemen, left in the dining-room, according to the fashion of the day, by the ladies, would rejoin them in the drawing-room with two, three or more much flustered, or drop one or two in the lobby incapable of showing face upstairs. But a rapid reform took place, and for a long time past any sign of alcoholic excitement in the drawing-room after dinner would lead to remark, and displeasure, and to quiet measures for withdrawing the offender. Cases of gross intoxication do occur certainly. But these are cases of the passion of drinking, "oinomania," or, in plain English, insane "drunkenism." There is thus a vast improvement in the habits of good society in Scotland, in the use of stimulants, during the last fifty years.

But I grieve to say that there is far from a similar improvement in the working classes. I am certain that proportionally drunken-

ness is more frequent there than it was. I cannot give you statistical proof. I would not give a rush for any such proof that may be offered me on one side or the other. But I can give you the result of my observation on the street and country roads. For, when I was a young man, and indeed till about thirty years ago, it was a very rare thing to meet a working man, either in town or country, who was drunk until the evening, after his work for the day was over; but for some time past such cases may be seen frequently at all hours of the day, and especially between one and two o'clock, which is their interval of work for dinner. I first observed this curious change, and mentioned my observation to various friends at the time who confirmed it, when about twenty-five or thirty years ago a great reduction was made in the excise duty on spirits. Within a few years the very high duty was restored, indeed was made greater than ever in Scotland; but there has been no improvement effected thereby in the appearance of things in our streets. Great exertions have been made by the educated classes to cure this fearful malady; and I must not say anything to undervalue their exertions in establishing temperance societies, and total-abstaining clubs. Bnt I doubt whether many drunkards have thus been permanently reformed, and of the many guiltless who join these associations in youth, it may be a question whether any material number would have fallen victims to the vice if unprotected by the pledge, simply because a preponderating mass of the population have no natural tendency to fall in this way.

You also ask "what amount of crime is produced by the abuse of stimulating liquors?" When I was professor of medical jurisprudence for ten years, and for ten years more during which I kept up my connection with criminal trials as a crown referee and witness, I had ample occasion to verify the statement made by our procurators-fiscal, sheriffs, and public prosecutors,—that three-fourths of crimes against the person are more or less connected with drunkenness, and very many owing to that cause alone.

Lastly, you ask "what are the effects of the abuse of alcoholics on the health and prosperity of the people?" Here however two questions are embraced in one. I shall answer only that which relates to the health of the community. But if the vice of drunkenness damages the health of the people, and accounts for even only one-half of the cases of crime against the person, I imagine it will be unnecessary to answer the second branch of your third question,—"what is the effect of the abuse of alcoholics on the prosperity of the people?"

The influence of the vice of drunkenness on the health was

ought very early under my notice, in consequence of my being
very many years, and from a very early age, a medical officer of
r infirmary, at a time when various epidemics prevailed; and, as
ofessor of materia medica, I have had time to methodize my
ews on this subject as a branch of the action of alcoholics, in re-
ion both to diet, and to medicines proper. Thus, in the first
ace, I recognize certain diseases which originate in the vice of
unkenness alone, which are delirium tremens, cirrhosis of the
er, many cases of Bright's disease of the kidneys, and dipso-
nia or insane drunkenism. Then I recognize many other dis-
ses in regard to which excess in alcoholics acts as a powerful pre-
posing cause, such as gout, gravel, aneurism, paralysis, apoplexy,
ilepsy, cystitis, premature incontinence of urine, erysipelas, spread-
g cellular inflammation, tendency of wounds and sores to gangrene.
ext, I recognize as a wide-spread result of habitual excess, an in-
ility of the constitution to resist the attack of diseases at large.
nd lastly, I recognize a greater inability, than in the sober, to sus-
in the treatment which is necessary or most serviceable in dis-
ses generally. If all these ways of influencing mortality be taken
to account, it is evident that the sum total must be very great
deed, although it may be impossible to express it numerically.
ow can we ever hope to express numerically the influence of
unkenness in aggravating the mortality from fevers, cholera, dys-
tery, and other zymotics? How much more difficult, when the
estion is with apoplexy and the long catalogue of other diseases
which the vice is the predisposing cause? No hospital physician,
wever, of long experience can doubt for a moment the enormous
ect of habits of drunkenness in increasing one way and another
spital mortality,—that is, the mortality of the working classes.
etails on this head would lead me to write a book, in place of a
ter. But let me conclude with one illustrative fact. I have had
earful amount of experience of continued fever in our infirmary
ring many an epidemic, and in all my experience I have only
ce known an intemperate man of forty or upwards recover. He
s the *exceptio quæ firmat regulam.*

I will gladly learn what you think of all this. But remember
am not one of those who would deprive the world of alcoholics,
r the sake of those who abuse them; I am not one of those smug
ilanthropists, who would ask a government "to permit me to pre-
nt you from having your grog." If a man, in face of universally
mitted consequences, will insist on habitually getting drunk,—
id facias illi? Jubeas miserum esse, libenter quatenus id facit.

I am yours most faithfully, D. R. Christison.

UNITED STATES CONSULATE, ROTTERDAM,
Nov. 9th, 1870.

SIR:—I have the honor to transmit to you the enclosed documents which I have just received after so long a delay. In forwarding them to me, the secretary of the society* explained that delay by stating that my letter was only received after the preceding trimestrial meeting, and that it had to be referred to the following meeting.

The within statement is an extract of the letter which accompanied the pamphlet.

I shall always be very happy to do anything for which you may have an opportunity of applying to this Consulate.

Very respectfully yours,

(Signed) FREDERICK SCHÜTZ, *U. S. Consul.*

In this country gin is the beverage of the people, and to such an extent as to create a general anxiety about the future of a nation committing excesses in that beverage, condemned as well for moral as physical and economical reasons.

The minister of finances estimated the revenue on gin for 1871 at 14,200,000 florins, gin paying 53 florins duty per hectolitre of fifty degrees strength. The quantity used for technical or other purposes is hardly anything.

Calculating the population of the Netherlands at three and a half millions, and taking off three-fourths for women, children and very old people, show that one-fourth of the whole population furnishes a tax of more than 14 millions of guilders, and undoubtedly the same amount to inn-keepers, etc.

It is calculated that twenty-eight-thirtieths millions of florins are spent in gin by the people.

We believe that every drop of alcohol is injurious and the beginning of wilful poisoning, as it is incessantly proclaimed by our renowned oculist, Professor Donders; and that this kind of alcohol, obtained by distilling, does not mix itself with the blood, but runs through all blood vessels, acting injuriously on the brain and impairing the best human faculties down to second and third generations.

The investigations of the society have led to the result that the number of drinkers of gin has considerably decreased, that the use of that beverage by higher and middle classes is considered indecent, and that the people are coming to the conviction that, in

* Societé Néerlandaise pour l'abolition des boissons fortes.

the interest of peace and public order, intoxicating liquors must be abolished.

By statistics it is shown that fifteen-sixteenths of the crimes committed result from the use of gin.

HIOJO, JAPAN, Oct. 17th, 1870.

DEAR SIR:—Your letter of the 23d of February was handed not long since by Mr. Stewart, the American Consul, with the request that I should answer it.

The chief intoxicating drinks used in Japan are a simple fermented liquor from rice, called Saki, and a distilled liquor called Shochin.

In the island of Kinsin, wine is made from grapes.

There is a great deal of saki consumed in Japan; but probably less drunkenness seen on the streets, at least, than in America; and whether there is really less drunkenness it is hard to say. The opinion of the best informed men is, that most of the drinking is done at home, and hence not noticed by casual observers, but that there is more drinking to excess here than at home.

With reference to the amount of crime traceable to the use of intoxicating liquors, there are no statistics at my disposal, and the observation of the most favored foreigners has been so limited that any opinion would be of no value. I have written to the authorities on the subject, but have as yet received no answer; if one arrives with any information on the subject, I shall be most happy to forward it to you.

Yours, very respectfully,

D. C. GREENE.

CONCORD, MASS., Dec. 17th, 1870.

DEAR SIR:—I have just received through Mr. Brewer, your circular of February 10, an answer to which, I fear, I shall not be able to make very satisfactory from the imperfect data I have at hand. Had I been consulted in season, I would have advised the addressing your circular either to Attorney-General Stephen H. Phillips, or to Dr. G. P. Judd of Honolulu, or to some other resident physician. Mr. Phillips is now on a visit to his friends in Salem, Mass.

The amount of crime caused by the use of alcoholic drinks can only be determined by the records of police courts, of which I have no reports.

The answer to your first question, "what are the chief intoxicating articles used in the Sandwich Islands?" may be found in the Honolulu custom-house returns, from which I copy as follows:—

Invoice Values.

	1867.	1868.	1869.
Importation of English "ale and porter" and German "beer," chiefly lager beer, . . .	$38,526 18	$38,073 70	$20,246 16
Importation of "spirits" (consisting of American whiskey, French brandies, Holland gin and West India rum), ...	23,288 70	35,907 24	33,870 98
Importation of "wines" (mostly French and German, with a small proportion of California), . .	8,451 37	12,030 60	15,801 46

Spirits taken out of Bond for consumption in 1869.

Rum, ...	396 gals.	Port, ...	201 gals.
Gin, ...	5,239 "	Bitters, ...	177 "
Brandy, ...	4,537 "	Sundries, . . .	328 "
Whiskey, . . .	4,177 "		17,016 gals.
Alcohol, ...	799 "		
Sherry, ...	1,162 "		

Estimated revenue from duties on spirits and wines for two years 1870–1 and 1871–2, $85,000.*

The distillation of spirits in the Hawaiian Islands is prohibited by law. Illicit distillation, however, has been carried on to a considerable extent; and the government has never been able to entirely suppress it. The amount of the domestic article is insignificant when compared with the amount imported. It is the product of a native root called "Ti" root which is rich in saccharine matter. The traffic in "Ava," also a native root, is legalized, used chiefly by natives, as a medicine ostensibly, but really for no other than intoxicating purposes. With its narcotic stimulant properties and its action on the skin, you are doubtless familiar.

* *Vide* Ministerial Report.—Duty on spirits, $2.50 per gallon. Duty on wines, 5 cents per gallon.

The traffic in opium is legalized, and its consumption, though chiefly confined to the Chinese, is beginning to find favor with the native population. A Chinese merchant paid, about two years since $9,000 for the exclusive right of the trade in opium in the Hawaiian Islands.

Besides the product of the "Ti" root (a spirit of about the strength of American whiskey), the natives prepare a stimulating beverage by the fermentation of sweet potatoes and of molasses when they can obtain it; not openly, however, as this also is unlawful.

The native population of the islands is about 55,000.

White foreign population does not exceed 4,000.

Chinese population about 2,000.

Of the foreign white population, not more than one-half are addicted to the use of intoxicating drinks. Very little, if any, is taken by the Chinese. And as the sale of all intoxicating beverages to natives is prohibited by law, enforced with severe penalties, the consumption by this class of the population is comparatively trifling.

The amount of alcoholic drinks imported into the Hawaiian Islands appears large when compared with the whole number of consumers, probably not exceeding two or at most three thousand. But by far the largest consumption is, no doubt, to be placed to the account of the great number of seamen annually visiting the different ports of the islands.

Your circular calls for the "relative amount of intoxication" (at the Sandwich Islands) and "that seen in the United States." But having resided abroad for thirty years past I have had but little opportunity of observation as it respects the relative or actual consumption of spirits in this country. And I have therefore given the total amount of the consumption at the Sandwich Islands with the number of consumers as nearly as can be ascertained, leaving the comparison with the United States to be made by those better informed than myself. As I am in doubt also as to the limitations (if any) under which the word "intoxication" is to be taken in the circular, I have preferred giving the *facts*, leaving the *effects* to be inferred.

In regard to the "effects" however "of alcoholic beverages upon the health and prosperity of the people" of the Hawaiian Islands, instead of my own "opinion" I am able to give you what will have far more weight—the views of the Hawaiian government—which may be inferred by its course of legislation in respect to alcoholic beverages during a period of fifty years. The importation of in-

toxicating beverages into the Hawaiian Islands, except for medicinal use, was some years subsequently to the arrival of the American missioneries, 1820, absolutely prohibited, and this prohibition continued in force till 1839, when (in July of that year) it is well known that the king of the Sandwich Islands, in order to avert the threatened bombardment of his capital by the French frigate "Artimise," signed a treaty, urged at the cannon's mouth by Capt. La Place, admitting French brandies ("eaux-de-vie") at a duty not exceeding five per cent. Subsequently other nations in treaty with the Sandwich Islands claimed the same privilege by the "parity clause." For several years subsequent to the visit of the "Artimise," the French consul and other interested persons, made strenuous efforts, though without success, to induce the Hawaiian Legislature to repeal the law prohibiting the sale of intoxicating drinks to natives. The French consul insisted that the law contravened the spirit of the treaty, but this pretension was finally abandoned.

In contrast with the treatment of the Hawaiian Islands by the French, we are reminded of the very different policy they found it necessary to adopt for the government of Tahaite, of which they took possession in 1839. Very soon after its occupation by the French, intoxicating beverages were classed with the contrabands, and the prohibition has been continued to the present time.

With more time, I might have made my answer more full and direct to the points of your circular, but Mr. Brewer informed me that you desired a reply without delay.

Very truly yours,

R. W. Wood.

Utrecht, December 22, 1870.

Dear Sir:—The honorable Mr. J. J. Van Osteyee asked the favo[r] of me to answer your favor of February 23, and so I have the hono[r] to inform you, that the principal strong drinks which are consume[d] in the Netherlands are, Genevee, which is made out of corn, an[d] used principally by the poorer classes, whilst the wealthier folk[s] drink punch and different strong liquors.

We have in the Netherlands for the last twenty-five years [a] society, which does not work strictly for temperance, whose limit[s] are difficult to define, but whose aim is to abolish the consumption of strong drinks, which, owing to the misery they produce, can be called a canker which destroys the prosperity of the people. Spread out over different sections of the country, the society, which counts

already several thousand members and increases always more and more, endeavors to persuade the people with the help of tracts and public meetings, what awful consequences arise from the abuse of these drinks, and although it has done a great deal of good in that direction, the members of the society giving good example by words and deeds, it waits always for severe measures on the part of the government.

Concerning your second question with regard to the consequences which these hurtful drinks exercise upon the health and prosperity of the people, the best answer will be the statement of our two most renowned medical professors, which was accompanied by the signatures of more than six hundred physicians throughout the Netherlands, of whom twenty-two live in our city, the contents of which statement is as follows:—

The undersigned physicians will sustain as much as possible the members of the Nederlandish Society for abolition of the consumption of strong drinks in their efforts in this behalf, and will work to remove the wide-spread prejudice as to the usefulness of the moderate use of strong drinks, and in consequence consider it their duty to give the following explanations as to the influence of strong drinks on the human body:

1. The moderate use of strong drinks is always unhealthy, even when the body is in healthy condition; it does not do any good to the digestion, but even interferes with that process, for strong drinks can only temporarily increase the feeling of hunger, but not in favor of digestion, after which strong reaction must follow, and evils which are usually attributed to other causes, but often result from the habitual use with moderate drinkers.

2. The assertions, that intoxicating drinks used moderately, are naturally innocent means of cheering up, that they are useful in severe colds, or that they are with laboring men equivalents for sufficient nourishment, or useful in misty and humid air, or for people obliged to work in the water, or a protection against contagious diseases, are without any foundation, and contradictory to experience and to human reason, and the habitual use of the same has therefore an unhealthy effect, and an influence unlike what people expect from them.

3. The habitual use of strong drinks works most perniciously on all diseases and especially on consumption.

4. Regarded as the usual drink of all classes, they are not only improper on account of the above reasons, but also against moral development and material prosperity in such measure, as to be considered and to be stamped as the greatest underminers of the actual welfare of mankind.

(Signed) C. B. TILAMUS,
P. U. SWINGAR,
Professors.

AMSTERDAM, March 19, 1846

In spite of this concise explanation, which was printed and distributed among the people and of all the efforts which the society uses, to work against the abuse in the consumption of strong drinks, the number of those, who are the slaves of this evil and subject to the consequences arising from the same, is still very great.

It can be said according to a source based on an eighteen years' experience, that the number of misdeeds committed under the influence of intoxication amounts to more than seventy-five to eighty per cent. I should be glad if these lines were satisfactory to your philanthropic intentions.

The delay in answering your favor is due to the lack of time in consequence of the same being taken up by my profession, I being principal teacher (superintendent) of the public schools.

Hoping that you will excuse the delay, I wish that you may work for our principles in your industrial country on the other side of the Atlantic, and that you may be able to contribute something towards the abolition of the mischievous drinking, in order that your fellow-citizens may become temperate, economical and industrious members of your republic, striving for perfection.

I have the honor to be with high esteem, very respectfully yours,

J. VISSCHER, *Chairman for the Department of Utrecht,*
of the Nederlandish Society for the Abolition of Strong Drinks.

BOSTON, January 29, 1871.

DEAR SIR:—The chief intoxicating articles used in Panama and Darien are annisette, cocoa-nut milk, wine from the wine-palm, a drink made from bananas and plantains, and a milky-looking liquid made only by the Sassardi-Morti Indians at Darien.

The annisette is brought wholly from Cartagena or Santa Marta, and is not made by the Indians. A little over a thimbleful will intoxicate any person not used to it, and none can bear more than an ordinary sized wine-glass full. It is nearly colorless, though slightly tinged with violet. It is said to be very injurious in its effects, few constitutions being able to bear constant use of it but a few years, or in some cases, months.

Cocoa-nut milk is made by covering half ripe nuts with a few inches of sand on the seashore, just above high tide, and leaving them for about six weeks. In this length of time the milk ferments and becomes as thick as cream, and next to annisette (or the European drink, aguadente), is the most intoxicating drink used by the natives. As it will not keep, the Indians as a general rule have their stock of buried cocoa-nuts, which they use as they want.

The wine made from the wine-palm is produced by squeezing the it in a press similar to the sorghum presses used in the West. e Indians make considerable quantities of it, and use it exten- ely in their households. It is only a moderate kind of stimulant, elieve, and seemingly not injurious when used moderately.

The drink made from bananas and plantains is quite similar to e cocoa-nut milk, though not nearly so powerful in its effects. ere does not seem to be a great quantity of it used, from the ct I suppose of the cocoa-nut milk being easier to manufacture; t the Indians appear to drink it with great relish whenever they n obtain it.

The milky-looking liquid is manufactured by the Sassardi-Morti dians principally; it may be by the others also, but Sassardi is e only place where I have ever seen it. Its composition is wholly known to me, but I imagine it has several component parts. It not very strong, and is said by those who have tasted it to be a ry pleasant acid drink, little stronger, if any, than cider.

The amount of crime produced by the use of the aforesaid drinks a thing impossible to ascertain, but I judge not nearly so much with white people under the same circumstances.

The relative amount of intoxication in Panama and Darien nong the Indians) is much less than has been commonly believed. course there are certain ones among them that are drunkards, t as a general rule, they are a much more temperate set than the ites. One circumstance was noticeable everywhere,—the less e civilization, the less the intoxication. At San Blas (Carti), ere the Indians are far more advanced in civilization than at ledonia Bay, or the Atrato, the amount of intoxication was fully o hundred per cent. more. But even there the number of unken Indians in the little community was far less, I should judge, an it is in correspondingly large towns in the United States.

Respectfully yours,

E. W. Bowditch,

Late Mineralogist Darien Expedition of 1870.

RTALITY OF THE CITY OF BOSTON

In 1870.

MORTALITY OF THE CITY OF BOSTON

In 1870.

MORTALITY OF THE CITY OF BOSTON IN 1870.

The mortality of a great city like Boston is usually expressed by a death-rate applied to the whole population. Sometimes the death-rate can be given by wards, but such divisions of territory are unsatisfactory for sanitary comparison. A portion of a ward may be good and another portion obviously bad in this respect. Ward six illustrates the difference. One side of Beacon Hill is made up of the very best, and the other side of the very worst houses; yet both are included in the same ward lines. It is desirable to be able to compare the death-rate in certain sections of Boston which are marked by various distinctions which may be supposed to influence the duration of life. With this view the city has been divided into twenty-four *Health Districts*, which are represented on the accompanying map. They are numbered from twenty to forty-three to avoid all chance of their being confounded with wards.

The "new land," or land reclaimed from the sea by filling with earth, is represented on the map by a dark gray tint. It will be seen that it includes already as much territory as was comprised in the peninsula of old Boston. The process of "filling," commenced in the last century, is still going on.

A word of caution may be given with regard to the fair interpretation to be put on results thus reached. Every one will of course see that there are many considerations relating to the general circumstances of the inhabitants to be weighed before a judgment can be formed as to the salubrity of "made land." The new land of Rochester and Genesee Streets is not necessarily chargeable with the high death-rate of that section, for it is quite equalled by the death-rate of the orginal land of the North End. Neither must the new land of the Back Bay be

edited with the low death-rate of that region, since the iginal land of the Highlands (District 41) is equally exempt om mortality. Another consideration, less obvious, is equally portant to remember. There are large sections in which the mber of servants nearly equals the number of persons of all es in the families employing them. These domestics do not ve their own children with them, and in case of severe illness, eceding death, they very often go to other places.

District No. 20 is East Boston.

District No 21 is ward two, or the North End east of Haverll and Blackstone Streets. A large part is made up of warehouses. Streets narrow. Inhabitants chiefly Irish.

District No. 22 is the portion of ward three, east of Poplar reet. It includes the streets on either side of Leverett reet, and a portion of the old "mill pond."

District No. 23 is a district of which the Massachusetts Hostal is the centre, and includes the north side of Beacon Hill. contains a large proportion of all the colored inhabitants of e city.

District No. 24 is that portion of ward four, enclosed by anover, Court and Green Streets. Portland Street runs rough the middle of this district. It includes most of the d "mill pond."

District No. 25 takes the rest of ward four.

District No. 26 is ward five.

District No. 27 is the south side of Beacon Hill, from Revere reet to the Common, and from the State House to Charles reet. It also includes a small territory on the north side of eacon Hill, on either side of Hancock Street. It is nearly all iginal soil. The inhabitants are almost exclusively American.

District No. 28 is all "made land." It extends from Commonwealth Avenue to Charles River, and also includes the ritory between Charles Street and the river, down as far as mbridge Bridge. Inhabitants almost exclusively American.

District No. 29 is the portion of ward seven on the Oldston side of the channel. It is all "South Cove" land, reimed from the sea. Inhabitants chiefly Irish and German.

District No. 30 is the northern half of South Boston. A ry large proportion of the inhabitants are Irish.

District No. 31 is ward eight. Its centre is about the cor

ner of Hollis and Washington Streets. It includes a portion of "South Cove" made land. A mixed population of Americans, Irish, Germans, and a good many Jews.

District No. 32 is that part of ward nine which lies west of Berkeley Street and Columbus Avenue. It is all made land, and is occupied almost exclusively by Americans.

District No. 33 is the "Church Street District." Many Jews live in this region. It is nearly all "made land."

District No. 34 is the "Suffolk Street District." Nearly all "made land."

District No. 35 is ward ten, west of Dover Street. More than half is "made land."

District No. 36 is ward eleven, east of Northampton Street.

District No. 37 takes the rest of ward eleven, and the portion of ward fourteen north and east of Washington Street. It includes the sunken Ruggles Street territory which the health authorities of Boston have suffered to be covered with expensive houses in 1870.

District No. 38 is the southern half of South Boston, including Washington Village, and (together with No. 39) the low, marshy region on the borders of the South Bay, referred to in the "Report on Flats and Water Areas," presented to the last Legislature.

District No. 39 is ward thirteen. Like the preceding district a large portion is so low as to make drainage difficult if not impossible. It is being occupied, however, by tenements and other houses, in violation of the law relating to "wet and spongy lands."

District No. 40 is ward fourteen, south and west of Washington Street, and including Mount Pleasant.

District No. 41 is Roxbury Highlands, or the portion of ward fifteen, south of Washington Street.

District No. 42 is the portion of ward fifteen, north of Washington Street. It includes the upper part of Tremont Street, the breweries, bone-boiling establishments, and what is known as "Grab Village." A mixed population of Irish, Germans and Americans.

District No. 43 is Dorchester, extending south to Neponset River, and including territory of great extent, but (as compared with old Boston) sparsely peopled.

The deaths and their causes in each of these districts have been obtained through the kindness of Mr. Apollonio, the City Registrar, by whom they are always recorded with great fidelity. He has allowed the State Board of Health every opportunity to examine the returns.

The population of the Districts has been obtained from the enumerators engaged in making the census of 1870. Application was made to the United States authorities at Washington, for permission to employ these officers in noting on the margin of their returns the facts we required. This was freely given, and by the kind co-operation of Gen. Andrews, U. S. Marshal, we have been enabled to obtain such information as was needed to carry out the original design.

The facts thus collected have been arranged in such manner as to show the comparative prevalence of each of the most prominent causes of death in all parts of Boston.

The following tables, by which this result is reached, have been prepared, since the close of the year to which they refer, by Dr. Frank W. Draper of Boston.

Analysis of the Mortality of Boston in 1870; *showing the number of deaths from various causes, and at various ages, in each of Twenty-Four Districts.*

HEALTH DISTRICT.	Scarlatina.				Measles.				Smallpox.				Croup and Diphtheria.				Typhoid Fever.			
	Under 1 year	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.
20, . . .	5	26	14	45	1	–	–	1	–	–	2	2	2	13	4	19	–	3	21	24
21, . . .	3	8	–	11	3	14	1	18	–	–	2	2	3	8	2	13	–	3	18	21
22, . . .	1	3	1	5	–	–	–	–	–	–	3	3	–	2	–	2	–	–	8	8
23, . . .	–	1	3	4	–	2	1	3	–	–	2	2	1	2	–	3	–	–	8	8
24, . . .	–	1	–	1	1	–	–	1	–	–	1	1	–	2	–	2	–	–	3	3
25, . . .	–	1	1	2	–	–	1	1	–	–	1	1	–	–	–	–	–	–	2	2
26, . . .	–	3	–	3	–	2	1	3	–	–	1	1	1	6	–	7	–	2	11	13
27, . . .	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	–	–	3	3
28, . . .	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1
29, . . .	1	4	1	6	1	2	1	4	–	–	–	–	–	3	–	3	–	1	3	4
30, . . .	5	13	9	27	4	8	2	14	–	–	3	3	5	13	3	21	–	1	10	11

32, . . .	–	1	1	2	–	–	–	–	–	–	–	–	–	1	–	1	–	–	–	–
33, . . .	–	–	1	1	–	–	–	–	–	–	–	–	–	2	1	3	–	–	5	5
34, . . .	–	3	3	6	2	–	–	2	–	–	–	–	–	1	2	3	–	–	4	4
35, . . .	1	7	2	10	–	–	–	–	–	–	–	–	1	4	1	6	–	–	7	7
36, . . .	1	3	1	5	–	1	–	1	–	–	–	–	–	1	1	2	–	–	3	3
37, . . .	1	3	2	6	–	–	–	–	–	–	–	–	–	7	2	9	–	–	6	6
38, . . .	–	–	–	–	–	–	1	1	–	–	1	1	–	6	2	8	–	–	1	1
39, . . .	1	11	3	15	1	–	–	1	–	–	1	1	1	7	2	10	–	–	5	5
40, . . .	–	3	3	6	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3	3
41, . . .	1	4	–	5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1
42, . . .	8	18	8	34	–	–	–	–	–	–	–	–	–	3	–	3	–	–	10	10
43, . . .	1	2	2	5	–	–	–	–	–	–	–	–	–	5	2	7	–	–	8	8
Grand Total, .	29	116	56	201	14	29	8	51	–	–	19	19	15	88	22	125	–	11	149	160

Analysis of the Mortality of Boston—Continued.

HEALTH DISTRICT.	Diarrhœa and Dysentery.				Cholera Infantum.				Consumption.				Tubercular Meningitis.			
	Under 1.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.
20, . . .	11	6	6	23	30	5	–	35	3	2	66	71	3	2	–	5
21, . . .	13	9	7	29	55	19	–	74	2	5	97	104	1	2	–	3
22, . . .	3	1	5	9	11	4	–	15	1	–	51	52	–	–	–	–
23, . . .	7	1	9	17	15	5	–	20	1	–	51	52	2	2	–	4
24, . . .	5	–	2	7	17	1	–	18	2	2	15	19	–	1	–	1
25, . . .	–	–	4	4	2	–	–	2	–	–	4	4	–	–	–	–
26, . . .	3	5	2	10	13	6	–	19	2	1	54	57	1	1	–	2
27, . . .	–	–	2	2	1	–	–	1	–	–	9	9	1	–	–	1
28, . . .	–	–	–	–	1	–	–	1	–	–	4	4	–	–	–	–
29, . . .	8	2	3	13	23	7	–	30	2	2	41	45	–	–	–	–
30, . . .	19	4	9	32	75	22	–	97	2	5	140	147	4	4	1	9
31, . . .	2	–	7	9	10	2	–	12	–	1	40	41	–	–	–	–

34,	4	2	1	7	16	4	–	20	–	2	21	23	–	1	–	1
35,	1	2	3	6	14	1	–	15	–	1	39	40	1	–	–	1
36,	1	1	2	4	3	–	–	3	–	–	21	21	–	1	–	1
37,	3	3	2	8	16	6	–	22	–	2	38	40	2	1	–	3
38,	1	–	2	3	18	2	–	20	–	–	14	14	–	1	–	1
39,	5	–	5	10	18	8	–	26	–	–	29	29	–	–	–	–
40,	–	–	1	1	10	7	–	17	–	–	15	15	1	1	–	2
41,	1	1	–	2	6	2	–	8	–	–	8	8	–	–	–	–
42,	9	6	4	19	20	10	–	30	–	1	42	43	3	4	–	7
43,	1	1	4	6	26	5	–	31	–	–	24	24	–	–	–	–
Grand Total,	99	46	80	225	404	117	–	521	15	26	847	888	19	21	1	41

Analysis of the Mortality of Boston—Concluded.

HEALTH DISTRICT	MARASMUS.				PNEUMONIA.				ALL OTHER CAUSES.				AGGREGATE.			
	Under 1.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.
20, . . .	15	1	–	16	10	5	20	35	53	27	122	202	133	90	255	478
21, . . .	23	12	4	39	7	17	25	49	95	45	227	367	205	142	383	730
22, . . .	4	4	2	10	7	7	14	28	30	14	58	102	57	35	142	234
23, . . .	9	1	–	10	2	1	16	19	22	10	111	143	59	25	201	285
24, . . .	4	1	1	6	2	2	5	9	22	10	53	85	53	20	80	153
25, . . .	1	–	1	2	3	1	1	5	3	2	41	46	9	4	56	69
26, . . .	1	–	–	1	7	4	19	30	28	18	119	165	56	48	207	311
27, . . .	1	–	–	1	–	–	6	6	4	2	31	37	8	2	51	61
28, . . .	–	–	–	–	–	–	1	1	2	–	5	7	3	–	11	14
29, . . .	4	2	–	6	7	3	17	27	35	15	74	124	81	41	140	262
30, . . .	16	10	1	27	12	20	29	61	118	52	211	381	260	152	418	830
31, . . .	1	1	1	1	1	1	7	10	24	6	96	126	40	16	102	220

33, . . .	1	–	–	1	1	2	7	10	12	7	34	53	16	13	63	92
34, . . .	4	1	–	5	4	2	6	12	7	6	46	59	37	22	83	142
35, . . .	1	2	–	3	5	1	13	19	23	12	74	109	47	30	139	216
36, . . .	1	1	1	3	–	3	8	11	13	3	41	57	19	14	78	111
37, . . .	4	1	–	5	6	6	9	21	30	11	72	113	62	40	131	233
38, . . .	6	4	–	10	7	4	3	14	17	11	67	95	49	28	91	168
39, . . .	1	1	–	2	5	4	11	20	31	11	55	97	63	42	111	216
40, . . .	1	–	1	2	1	2	2	5	16	7	45	68	29	20	70	119
41, . . .	–	–	–	–	1	1	5	7	5	3	23	31	14	11	37	62
42, . . .	2	6	1	9	8	8	13	29	37	17	69	123	87	73	147	307
43, . . .	1	–	1	2	–	1	6	7	24	8	79	111	53	22	126	201
Grand Total, .	101	49	14	164	97	98	244	339	656	299	1,764	2,719	1,449	900	3,204	5,553

Ratio of Mortality, showing the Number of Deaths from various Diseases to One Thousand of Population.

HEALTH DISTRICT.	Population, June, 1870.				Scarlatina.				Measles.				Smallpox.			
	Under 1 year.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.
20, ...	664	2,270	22,582	25,516	7.5	11.5	.6	1.7	1.5	–	–	.03	–	–	.1	.1
21, ...	720	2,610	21,589	24,919	4.2	3.	–	.4	4.2	5.3	.1	.7	–	–	.1	.1
22, ...	264	743	8,568	9,575	3 8	4.	.1	.5	–	–	–	–	–	–	.4	.3
23, ...	164	753	9,981	10,898	–	1.3	.3	.4	–	2.6	.1	.3	–	–	.2	.2
24, ...	109	386	5,225	5,720	–	2.6	–	.2	9.1	–	–	.2	–	–	.2	.2
25, ...	22	88	4,387	4,497	–	11.4	.2	.5	–	–	.2	.2	–	–	.2	.2
26, ...	256	890	12,940	14,086	–	3.3	–	.2	–	2.2	.2	.2	–	–	.2	.1
27, ...	33	154	3,710	3,897	–	–	–	–	–	–	–	–	–	–	–	–
28, ...	30	126	2,279	2,435	–	–	–	–	–	–	–	–	–	–	–	–
29, ...	316	957	8,315	9,588	3 2	4.2	.1	.6	3.2	2.1	.1	.4	–	–	–	–
30, ...	1,007	3,310	28,439	32,756	4.9	3.9	.3	.8	3.9	2.4	.1	.4	–	–	.1	.1
31, ...	189	599	10,490	11,278	–	1.7	.1	.2	5.3	–	–	.1	–	–	.1	.2

34, ...	169	532	7,295	7,996	–	5.6	.4	.8	11.9	–	–	.3	–	–	–	–
35, ...	209	664	9,831	10,704	4.8	10.6	.2	.9	–	–	–	–	–	–	–	–
36, ...	86	371	7,352	7,809	11.6	8.1	.1	.6	–	2.7	–	.1	–	–	–	–
37, ...	295	1,033	10,562	11,890	3.4	2.8	.2	.5	–	–	–	–	–	–	–	–
38, ...	129	493	5,837	6,459	–	–	–	–	–	–	.2	.2	–	–	.2	.2
39, ...	254	937	7,345	8,536	3.9	11.7	.4	1.9	3.9	–	–	.1	–	–	.1	.1
40, ...	130	479	5,695	6,304	–	6.2	.5	.9	–	–	–	–	–	–	–	–
41, ...	162	668	5,924	6,754	6.2	5.9	–	.8	–	–	–	–	–	–	–	–
42, ...	301	939	6,858	8,098	26.4	19.1	1.1	4.3	–	–	–	–	–	–	–	–
43, ...	309	941	11,011	12,261	3.2	2.1	.2	.5	–	–	–	–	–	–	–	–
Grand Total, .	5,954	20,481	224,088	250,523	4.9	5.6	.2	.8	2.3	1.4	.03	.2	–	–	.1	.1

Ratio of Mortality—Continued.

HEALTH DISTRICT.	Croup and Diphtheria.				Typhoid Fever.				Diarrhœa and Dysentery.				Cholera Infantum.				Consumption.			
	Under 1.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.
20, . . .	3.	5.7	.2	.8	–	1.3	.9	.9	16.6	2.2	.3	.9	45.2	2.2	–	1.5	4.5	.9	2.9	2.8
21, . . .	4.2	3.	.1	.5	–	1.1	.8	.8	18.1	3.4	.3	1.2	76.4	7.3	–	2.9	2.8	1.9	4.5	4.2
22, . . .	–	2.7	–	.6	–	–	.9	.8	11.4	1.3	.7	.9	41.8	5.4	–	1.5	3.8	–	5.9	5.3
23, . . .	6.	2.6	–	.3	–	–	.8	.7	42.7	1.3	.9	1.6	91.5	6.8	–	1.8	6.	–	5.1	4.8
24, . . .	–	5.6	–	.4	–	–	.5	.5	45.9	–	.4	1.6	156.	2.6	–	3.1	18.3	5.6	2.9	3.
25, . . .	–	–	–	–	–	–	.4	.4	–	–	.9	.9	90.9	–	–	.4	–	–	.9	.9
26, . . .	3.9	6.7	–	.5	–	2.2	.8	.9	11.8	5.6	.3	.7	50.8	6.7	–	1.3	7.8	1.1	4.3	4.1
27, . . .	30.3	–	–	.3	–	–	.8	.8	–	–	.5	.5	30.3	–	–	.3	–	–	2.4	2.3
28, . . .	–	–	–	–	–	–	.4	.4	–	–	–	–	33.3	–	–	.4	–	–	1.8	1.6
29, . . .	–	3.1	–	.3	–	1.1	.4	.4	25.3	2.1	.4	1.5	72.4	7.3	–	3.1	6.4	2.1	4.9	4.7
30, . . .	4.9	3.9	.1	.7	–	.3	.3	.4	18.8	1.2	.3	1.	74.5	6.6	–	2.9	1.8	1.5	4.9	4.4
31, . . .	–	3.3	–	.2	–	1.7	.7	.8	10.6	–	.7	.6	52.9	3.3	–	1.1	–	1.7	3.8	3.6

33, . .	—	1.9	.3	.4	—	—	.5	.6	23.7	3.7	.1	.6	94.7	7.5	—	2.5	—	3.7	2.9	2.9
34, . .	—	6.	.1	.6	—	—	.7	.6	4.8	3.	.3	.5	66.9	1 5	—	1.4	—	1.5	3.9	3.7
35, . .	—	2.7	.1	.1	—	—	.4	.4	11.6	2.7	.3	.5	34.9	—	—	.4	—	—	2.8	2.7
36, . .	—	6.8	.2	.8	—	—	.5	.5	10.2	2.8	.2	.7	54.3	5.8	—	1.9	—	1.9	3.6	3.4
37, . .	—	12.4	.3	1.2	—	—	.2	.2	7.7	—	.3	.4	139 5	4.1	—	3.1	—	—	2.5	2.2
38, . .	.9	7.5	.3	1.2	—	—	.7	.6	19.7	—	.7	1.2	70.9	8.5	—	3.	—	—	3.9	3.4
39, . .	—	—	—	—	—	—	.5	.6	—	—	.2	.2	76.9	14.6	—	2.7	—	—	2.6	2.4
40, . .	—	—	—	—	—	—	.2	.1	6.2	1.5	—	.3	37.	2.9	—	1.2	—	—	1.4	1.2
41, . .	—	3.2	—	.4	—	—	1.5	1.2	29.9	6.5	.6	2.3	66.6	10.7	—	3.7	—	1.1	6.1	5.4
42, . .	—	5.3	.2	.6	—	—	.7	.7	3 2	1.1	.4	.4	84.1	5.3	—	2.6	—	—	2 2	1.9
43, . .	—	4.3	.1	.6	—	.6	.6	.6	16.6	2.3	.3	1.	67.9	5.7	—	2.1	2.5	1.4	3.8	3.5
Grand Total, .	2.5																			

Ratio of Mortality—Concluded.

HEALTH DISTRICT.	TUBERCULAR MENINGITIS.				MARASMUS.				PNEUMONIA.				ALL OTHER CAUSES.				AGGREGATE.			
	Under 1.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.
20, . . .	4.5	.9	–	.2	22.6	.4	–	.6	15.1	2.2	.9	1.3	79.8	11.9	5.4	7.9	200.3	39.6	11.3	18.7
1, . . .	1.4	.8	–	.1	31.9	4.6	.2	1.6	9.7	6.5	1.1	1.9	131.9	17.5	10.4	14.8	284.8	54.4	17.6	29.2
22, . . .	–	–	–	–	15.1	5.4	.3	1.	26.5	9.4	1.6	2.9	113.6	18.7	6.7	10.6	216.	46.9	16.7	24.4
23, . . .	12.2	2.6	–	.3	54.9	1.3	–	.9	12.2	1.3	1.6	1.7	134.1	13.4	11.1	13.1	359.6	33.2	20.1	26.1
24, . . .	–	1.3	–	.2	36.7	2.6	.2	1.	18.3	5.6	.9	1.5	201.8	25.9	10.1	14.8	486.1	51.8	15.2	26.7
25, . . .	–	–	–	–	45.5	–	.2	.4	136.4	11.4	.2	1.1	136.4	22.7	9.5	10.2	409.2	45.5	12.7	15.2
26, . . .	3.9	1.1	–	.1	3.9	–	–	.1	27.3	4.5	1.5	2.1	109.4	20.5	9.2	11.7	218.7	53.9	16.7	22.
27, . . .	30.3	–	–	.3	30.3	–	–	.2	–	–	1.6	1.5	121.2	12.9	8.3	9.4	242.4	12.9	13.7	15.6
28, . . .	–	–	–	–	–	–	–	–	–	–	.4	.4	66.6	–	2.2	2.8	100.	–	4.8	5.7
29, . . .	–	–	–	–	12.8	2.1	–	.6	22.4	3.1	2.	2.8	110.7	15.6	8.9	12.9	256.5	42.8	16.8	27.3
30, . . .	3.9	1.2	.04	.3	15.8	3.0	.04	.8	11.9	6.	1.	1.9	117.2	15.6	7.4	11.6	258.	45.6	14.6	25.3
31, . . .	–	–	–	–	5.3	3.3	.1	.3	10.6	5.	.7	1.1	126.9	10.	9.2	11.1	211.6	30.2	15.4	19.5

33, . . .	–	–	–	–	12.1	–	–	.2	12.	6.2	1.7	2.1	144.7	21.6	8.3	11.6	192.3	40.2	16.1	26.1
34, . . .	–	1.9	–	.1	23.7	1.9	–	.6	23.7	3.7	.8	1.5	41.5	11.3	6.3	7.4	219.	41.3	11.3	17.7
35, . . .	4.8	–	–	.1	4.8	3.	–	.2	23.9	1.5	1.3	1.7	110.	18.1	7.6	10.4	224.9	45.2	14.1	20.1
36, . . .	–	2.7	–	.1	11.6	2.7	.1	.3	–	8.1	1.1	1.4	151.2	8.1	5.6	7.2	220.9	37.8	10.6	14.2
37, . . .	6.8	.9	–	.3	13.2	.9	–	.4	20.4	5.8	.9	1.8	102.	10.7	6.8	9.1	210.2	38.6	12.4	19.4
38, . . .	–	2.	–	.2	46.5	8.1	–	1.5	54.2	8.1	.5	2.1	131.9	22.3	11.4	14.7	379.8	57.	15.5	26.
39, . . .	–	–	–	–	3.9	1.1	–	.2	19.7	4.3	1.5	2.3	118.1	11.7	7.5	11.3	244.	44.8	15.1	25.3
40, . . .	7.6	2.1	–	.3	7.6	–	.2	.3	7.6	4.2	.4	.7	123.1	14.6	7.7	10.7	223.1	41.7	12.2	18.8
41, . . .	–	–	–	–	–	–	–	–	6.2	1.5	.8	1.	30.9	4.5	3.9	4.5	86.2	16.3	6.2	9.1
42, . . .	9.9	4.3	–	.9	6.8	6.4	.2	1.1	26.5	8.4	1.9	3.5	122.9	18.1	10.1	15.1	289.	77.7	21.4	37.9
43, . . .	–	–	–	–	3.2	–	.1	.1	–	1.1	.5	.5	77.5	8.5	7.2	9.	171.2	23.4	11.4	16.3
Grand Total, .	3.2	1.	–	.2	16.6	2.4	.1	.7	16.6	4.8	1.1	1.4	110.2	14.1	7.9	10.9	243.3	43.6	14.2	22.1

NOTE.—In the foregoing tables all deaths in the city of Boston during 1870, are included, *except* those of still-born children, and deaths occurring at Deer Island, Carney Hospital, the Saint Anne Infant Asylum, and the Consumptives' Home in Willard Street. The deaths at the Massachusetts General Hospital and the City Hospital are transferred to the Districts in which the patients lived previous to their admission. 486 deaths are thus omitted from the tables because they could not fairly be assigned to the Districts in which the above-named public institutions happen to be situated. Adding this number to the 5,553 above accounted for, the total mortality of Boston becomes 6,039, and the death-rate 24.10 in a thousand.

contrast which is worthy of examination. These Distric
of nearly equal population and the numbers at all ages
nearly correspond, yet the mortality in one is half as
again as in the other. One is crowded, in great part dep
of sunlight, and full of nuisances; the other has abundan
light and air. Can a stronger argument be offered in fav
providing breathing spaces for the people than is presente
the figures in the first two horizontal lines of our second t
from one end to the other?

The very limited time which is given us between the co
tion of this tabular analysis at the close of the year, an
presentation of our Report to the legislature, must prevent
extended comment on the many instructive facts which it m
apparent.

THE VENTILATION OF SCHOOL-HOUSES.

By A. C. MARTIN, Architect,

of Boston.

THE VENTILATION OF SCHOOL-HOUSES.

The importance of thoroughly ventilating school-houses is acknowledged by everybody, while the number of persons who have considered the amount of ventilation required to keep a room in a wholesome condition, and the best way to produce the necessary change of air is comparatively small.

All know that the condition of the air in most school-rooms an hour after the session has commenced is very bad, so bad as to induce a morbid condition of the system, impairing the mental vigor of both teachers and scholars.

The cause of the trouble is commonly stated to be the presence of carbonic acid in the air which we exhale. When first thrown off from the lungs, it is warmer than the surrounding air and therefore rises to the upper part of the room; consequently, in the popular idea, the bad air is always at the top of the room. According to the same theory it is only necessary to make a hole somewhere in or near the ceiling to let it off, and thus the room is properly ventilated. This theory of ventilation, it should be noticed, makes no provision whatever for a supply of fresh air in those school-rooms (no small proportion of the whole number), which are warmed by stoves. In cases where furnaces are used, they are commonly regarded as sources merely of heat; seldom as the means of a supply of *fresh air*. Registers are placed somewhere in the floor, but their size and disposition are left to convenience or to the discretion of the furnace dealer, whose sole aim is to furnish *heat*, not air. True, some air must make its way through the hot-air pipes, but as soon as the temperature of the room is so high as to be too warm for comfort, the register is closed, thus shutting off entirely any supply of fresh air except what may creep in through the crevices around the doors and windows. If further relief from heat or close air becomes necessary, the windows are let

down a little from the top. The result of this is that the cold air rushes in and fills the bottom of the room, causing dangerous draughts for those who sit near the windows, and cold feet for everybody.

If we examine this popular notion concerning the theory and practice of ventilation, we shall find its explanation of the cause of the difficulty falls as far short of stating the whole case, as the remedy proposed fails to accomplish the desired end.

As we have seen, the carbonic acid gas exhaled from the lungs is looked upon as the principal evil. Its presence is, indeed, clearly recognized and the amount given off by the lungs has been determined to be about four per cent. of the air exhaled.*

But so far from its being the principal evil in vitiated air, it is proved by experiment that a still larger proportion of carbonic acid than is contained in the close air of an unventilated room, may be mixed mechanically with ordinary air, and breathed without inconvenience. The workmen engaged in the manufacture of soda-water do not experience any ill effects from breathing large quantities of it.

We must, then, seek further for sufficient causes for the foul condition of the air in an occupied room. We shall discover in it not only this deleterious acid, but in still greater proportion the watery vapor and the animal matter thrown off by both lungs and skin. The amount of watery vapor given off by the lungs and skin has been variously estimated as from twenty to forty ounces in the twenty-four hours, or about six to twelve grains (troy) per minute. This vapor contains animal matter which seems to putrefy almost immediately after being thrown into the air. It is the source of the vile odor in an ill-ventilated room, and, in its effects on the health, is far more dangerous than carbonic acid gas, which is now generally considered as acting rather as an obstructor of respiration than as a positive poison. No surer or more exact test than a well-educated nose has, as yet, been discovered to measure the amount of vitiating animal matter thus thrown into the air, but of its sources we can form some inferences.

* The difference in quantity is caused by varying circumstances. The amount thrown off is least during the night and greatest during the day. It would seem that the maximum and minimum amounts depend upon the state of digestion or the degree of physical exertion.

The immediate emanations of the body itself we have just mentioned. All clothing, carpets and furniture are adding constantly to the air the minute particles worn off by friction. A beam of sunlight thrown across the best-kept room marks its way on the dust in the air, and we all remember what we have seen floating in the air of school-rooms. Still another element of evil must be counted in the clothing of children of the poorer classes, which is worn and kept in homes that have never known an airing. It is easy to detect, in some school-rooms, the odors resulting from the different occupations of the children's parents, mingled with the scent from the frying of the family doughnuts or the smoke of the paternal tobacco-pipe. What science hints of the germs of disease in the air about us, might startle the most careless, but such details are unnecessary when we are discussing ventilation, not for cases where great crowds of people are assembled, or where unusual causes create foul air, as in the sick-wards of a hospital, but in relation to the far simpler question how we can best ventilate and warm our school-rooms.

One general consideration remains to be added to this brief statement of the elements of evil in foul air. The air we breathe is exhausted of its life-giving power after a few inhalations. Deprived of its normal proportion of oxygen, it is thus rendered unfit for its proper uses. Again, the carbonic acid, the watery vapor, the animal matter and the minute dust are soon diffused throughout the room. The question where the air is worst may be taken up later, but it must be manifest from what has been said that the entire air of a close room soon becomes vitiated in every part. Still further,—we are considering rooms in which the children daily spend five or six hours, the teachers, often seven or eight. The children are at an age when respiration is most active and when nature demands an ample supply of air of the purest quality.

We are, then, forced to conclude from the nature of the evil and from the imperative necessity of its entire removal, that no remedy can be successful which does not ensure a full and complete renewal of the air in the room as often as it becomes foul or dead. Nothing less than an absolute change of the whole volume of air can accomplish the object.

How often this should be done within a given time must d

pend upon the size of the room and the number and age of the persons occupying it. Authorities differ as to the amount of air to be supplied to insure a proper ventilation, but it is generally admitted that it should be not less than ten cubic feet per minute for each person. It may be that children require as much as adults, as they breathe faster. The actual amount of air-space in the room must also be carefully considered.

The Royal Commissioners appointed by the British government to inquire into the sanitary condition of barracks and hospitals, reported in 1857 that the capacity of the rooms should be not less than six hundred (600) cubic feet of air-space for each soldier, and the supply of air, per minute and per man, not less than twenty cubic feet. Messrs. Fairbairn, Glaisher and Wheatstone reported about the same time to the general bureau of health that the supply should be from fifteen to twenty cubic feet per minute for each individual. Gen. Morin, the director of the "Conservatoire des Arts et Metiers," gives the amount at from twenty to thirty cubic feet. These estimates, it will be observed, are for adults, and, in the case of the soldiers, for sleeping-rooms occupied from eight to nine hours consecutively. For children and school-rooms, the amount of air required varies, according to Gen. Morin, from seven to eighteen cubic feet per minute, in proportion to age; and the air-space from two to three hundred feet.

As an illustration, we will take an ordinary grammar school-room for fifty-six scholars. Such rooms in Boston are twenty-eight feet wide, thirty-two feet long and twelve feet high; containing 10,752 cubic feet, or 192 cubic feet to each scholar. If we assume ten cubic feet per minute as the minimum supply for each scholar, it will require 560 cubic feet of fresh air per minute for the school-room; or 33,600 cubic feet per hour. This supply would renew the whole volume of air in the room three times in an hour. If we assume fifteen cubic feet per minute for each scholar, it will require for the whole school 840 cubic feet per minute and 50,400 per hour, thus demanding the renewal of the whole volume of the air a little more than four and a half times per hour. The second estimate would prove, in practice, the proper one in the school-room designated, which is not large enough for so many occupants. It should contain at least 220 cubic feet of air-space for each individual.

We have now to consider the means of obtaining this indispensable fresh air. If the mere supply of warm air would ventilate an occupied room, we should have had the question of ventilation, for the cold season at least, settled thoroughly during the reign of hot-air furnaces. For the twenty years preceding the last decade, most school-houses put up in the cities contained neither grates or fire-places, for the furnace was considered the best means of heating and ventilating rooms, and even now some dealers specially advertise their wares as *ventilating furnaces.*

It is obvious that no means of supplying air can accomplish ventilation which does not also provide for the removal of the old and foul air. Any person accustomed to an open fire in a room partially heated by a furnace feels at once the difference in the quality of the air on going into the room of his neighbor who depends solely upon the hot-air register. The open chimney in the one case is constantly drawing off the bad air. In the other it escapes slowly, if at all, through crevices or by the occasional opening of the door. It not unfrequently happens that the hot air ceases to enter through the register for the want of an outlet, and the door must be opened in order to start it.

Our object, then, should be to seek such means of renewal and supply as shall cause and maintain a perfect balance between the in-coming and the out-going air. The old-fashioned fire-place is the first suggestion of the idea. The popular practice we have before mentioned was supposed to be an advance of improvement. It makes a hole near the ceiling to let out the bad air, opens the furnace registers, and considers the work done. On this principle no proper diffusion of fresh air could be obtained. A steady current would soon be established between the register and the ventilator, leaving dead air eddying up and down in the lower part of the room, which may be breathed over and over again before it is drawn into the main current and taken out of the room. Where a running stream passes by a cove of comparatively still water, a counter-current is almost always seen setting up along the shore.

When the air from the register is heated in the winter the difficulty is increased, as the current is accelerated and cold air remains nearly undisturbed, or settles down disagreeably upon the head and shoulders. A person sitting in a church near one

of the large hot-air registers will not unfrequently be annoyed by very perceptible counter-currents of cold air which set downwards beside the ascending hot stream.

To avoid these difficulties and secure the proper *diffusion* of the air are the main questions in all discussions of the subject. The systems proposed seem to have divided themselves into two great classes by taking up the subject at its two opposite ends, one looking to the out-going of the air, the other to its in-coming, though both have as a common aim the perfect balance of the two.

One system concerns itself only with supplying the air, leaving it to make its way out through ducts provided for the purpose. It accomplishes this by blowers or fans which press the air into the room. It is the *plenum* method, and may be farther characterized as the mechanical. It is expensive and requires great and constant care in working, while its success is sometimes doubtful. For these reasons it need not farther be considered for school-house ventilation.

The other system is directed to the withdrawal of the foul air, and this may be accomplished by means of natural laws requiring no machinery other than simple ducts. It is the *vacuum* method. It avails itself of the natural tendency of warm air to rise, which is the result of the law of the dilatation of gases.

"A volume of air heated from the freezing point to the boiling point of water (Barometer at 30 in.), expands .375 or about $\frac{3}{8}$ of its volume, or .002 for each degree Fahr."—(*Guy Lussac's law.*)

If the temperature of the air in a school-room is 20° higher than that of the exterior air its volume has been increased $.002 \times 20 = .04$ or $\frac{1}{25}$; consequently it is lighter than the exterior air and tends to rise. If a vertical duct or shaft, leading directly upward and out of the building, be connected with such a room a current of air will at once set up through it (subject to the conditions hereafter stated), unless it happens that the shaft or duct be cooled down to the exterior temperature by contact with the outer air. If necessary, heat can be applied to the lower end of the shaft, or the smoke-pipe from the furnace may be carried up through the duct, to increase its draught.

The necessary supply of an equal amount of fresh air will be

drawn into the room, either through the hot-air pipes of the furnace or some special ducts prepared for the purpose, or, failing these, it will work its way in about the doors and windows.

It will be readily understood from what we have before said that the mere hap-hazard arrangement of the register in the floor and the hole in the ceiling will not answer. Good ventilation consists in the proper distribution of the ducts for the outgoing and in-coming air, and in their proper relation and correspondence with each other, so as to secure the perfect removal of the bad air and the thorough diffusion of the new.

The power of a vertical duct to draw the air from a room results from the velocity of the flow of air through it. This velocity depends,—

First, Upon the difference between the external and internal temperature.

Second, Upon the height of the duct.

Third, Upon the resistance or friction; that is to say, upon the straightness and smoothness of the duct.

Fourth, Upon the sufficiency of the supply of air to replace that which is drawn from the room.

The amount of air evacuated by such a duct in a given time depends on the same four conditions, and also upon the area of a cross-section of a duct, that is, upon its size. The following general equations express these relations, in which,—

V is the mean velocity of the air in the duct.

K is a numerical co-efficient dependant upon the form, disposition and friction of the duct, and is constant for each duct.

T is interior temperature.

T′ is exterior temperature.

H is height of the duct.

A is the area of a cross-section of the duct.

Q is the volume of air passing in one second.

1. $V=K\sqrt{(T-T')\,H}$.
2. $Q=KA\sqrt{(T-T')\,H}$.

By an inspection of the above equations it will be seen that to increase the velocity of the flow of the air through a vertical duct, and consequently the drawing power of the duct, and also the amount of air evacuated in a given time, we must either in-

crease its height or the excess of the interior temperature above the exterior. By the interior temperature is meant that of the air in the duct, and this is practically the same as that of the room, unless additional heat is applied to the duct.

From the above principles it follows that when the height and disposition of the vertical ducts have been determined by the character of the building, their size should be estimated for summer ventilation when there is the least difference of temperature; and also that the ducts for the upper parts of a building should be made larger than those for the rooms below, if they are required to evacuate the same amount of air. The same reasoning applies to the hot-air pipes. They should be larger in area or cross-section for the rooms below than for those above, because they are shorter and consequently the velocity of the air would be less than in the longer pipes for the rooms above.

The question next arises as to the way of adapting the means to the end. Shall the vertical ducts lead out from the top or the bottom of the room? Shall the fresh air be taken in at the floor or at the ceiling? Which will work to best advantage, an upward or a downward movement in the air of the room?

It might seem at first a matter of small consequence where the air is taken out, since it is safe to say it would soon become bad in every part of a room, but the importance of the point will appear as we proceed.

At first sight it would seem easier to ventilate a room by the general upward movement of the air, because its tendency, when first exhaled from the lungs, is to rise.

A cubic foot of air at 60° Fahr., dew point 40° (Bar. 30 inches), will weigh 534.27 grs. A cubic foot of expired air at 95°, dew point 85°, containing 12.78 grs. of vapor and say four per cent. of carbonic acid, will weigh only 494.12 grs., or seven and one-half per cent. less.

This tendency is further increased by the heat given out from the body, which warms the air in immediate contact with it, so as to cause upward motion enough to be measured by the anemometer.

Nevertheless this upward movement, even when aided by the flow of hot air from the furnace fails to secure a proper diffusion of the fresh air. We have shown, in discussing the claims of furnaces as ventilators, how quickly a steady current will be

formed between the inlet and the outlet, leaving the bad air almost or quite unmoved, and only slowly and partially drawn into the current. If the attempt be made to diffuse the air by taking it in at several different places, it is apt to cause disagreeable draughts of warm air upon persons near the registers. Another objection will be found in the difficulty of heating a room ventilated in this way, because the hot air is drawn off too rapidly, while the great mass of cold air remains at the bottom of the room, thus making a marked difference of temperature between the air at the floor of the room and that at the level of the head, amounting often to six or seven degrees.

If, on the other hand, we connect the duct withdrawing the air with the lower part of the room, we shall have, in the first place, an advantage as obvious as it is important, in the removal of the foul air as nearly as possible at its source. By that law of the diffusion of gases, by which æriform bodies diffuse themselves through each other's masses to an unlimited extent, the carbonic acid in expired air would undoubtedly be diffused throughout the whole room. The aqueous vapor, loaded with animal matter, must also contaminate the whole atmosphere, so that, although after a full school-room has been shut up an hour, it would be hard to say where the air in it is worst, it is plain that the evil can be reached at its source, and should be removed at once before it spreads through the whole apartment. By using the downward movement the dust also (no small part of the trouble), will be drawn off immediately and not scattered everywhere. The emanations from skin and clothing are got rid of far sooner, and the clean and tidy children will not suffer so much from their less tidy neighbors. The good accomplished by the open fire-place is precisely on this principle of taking the air out of the bottom of the room. The whole subject may be well illustrated by the case of a reservoir or pond where some special cause of defilement exists at one end. If, instead of drawing or pumping out the foul water as nearly at the spot as possible, an engineer should undertake to draw it off through the clean water, allowing it to diffuse itself all the way, what folly it would seem.

The foul air should be taken out by openings so distributed around the bottom of the room that the currents of withdrawal shall affect all parts of it, while the fresh air should be introduced at the top. If it comes in at a temperature lower than

that of the room, it should be distributed as much as possible, and directed upward and along the ceiling, so as not to fall directly down upon the heads of those below.

If the air be heated and drawn in by a constant current, it will diffuse itself under the whole ceiling, and, arranging itself in layers, the warmest at the top, will gradually settle down through the room. The diffusion would be nearly or quite perfect, but for the unequal cooling of the air by contact with the outer walls. This inequality would be perceptible, however, only in extreme cases, and the heating of the room would be accomplished without draughts of any sort. For by taking the air out from the bottom of the room at a number of places, the velocity of the current of withdrawal through the registers can be easily made so small as not to be perceived; a current of air of the same temperature as the rest of the room is not unpleasant unless quite rapid, while a current of a higher or a lower temperature is disagreeable, though its velocity be no greater than the former.

So far we have considered the question in its simplest form, viz.: a vertical duct leading directly from the room into the open air. This would be impracticable in a large building, but the principle can be applied with equal success to any number or arrangement of rooms. The ducts should be made to connect with the bottom of a central shaft or chimney, of size and height sufficient to create a strong drawing power in all of them. The smoke-pipe of the furnace passing up through the chimney would aid the draught, or a fire can be built in a grate prepared for the purpose near the bottom. In this way, every part of a large school-house, rooms, halls, water-closets, can be effectually ventilated.

This method has a strong claim to favor from the facility with which the air of a room may be heated to a certain given point. To maintain an even temperature when the heat from the lungs and body is constantly thrown into the room, is one of the chief difficulties in the problem of good ventilation. The success attainable by the use of the downward movement has been repeatedly demonstrated in Europe, where it has been adopted for many years. It is clearly shown in the résumé of one of the most interesting of Gen. Morin's experiments. His object was to heat and ventilate the two amphitheatres or

lecture-rooms of the Conservatoire des Arts et Metiers at Paris, and his success is the more remarkable on account of the special difficulties of adapting ducts to the walls and rooms of an old building. On this account it was necessary to place the ventilating shaft or chimney in the court yard, at a distance from the two rooms. The ducts, which led from many openings around the bottom of both rooms, were connected with the bottom of the chimney where a grate was placed in which a fire was lighted while the rooms were in use, in order to quicken the draught. Both rooms were warmed by furnaces, the heat being taken in at many points around the top of the room. Cold-air flues were so arranged in connection with the hot-air pipes that the hot and cold air might be varied in quantity by opening and shutting valves, and thus the fresh air might be let into the room at just the right temperature. Gen. Morin gives a series of observations on the working of this system from December 16th, to January 9th. The small hall, which will seat 360 persons, held during this time an audience varying from 35 to 360 persons. In the large hall, seating 700, it varied from 278 to 680. Two sessions a day were held and the observations extended through twenty-eight sessions. The temperature out of doors ranged from 32° to 46° Fahr. In the small hall the mean temperature was 68°. The highest at any time was 72°, and this was reached but three times. The lowest, occurring but once, was 64.40°. In the large hall, the mean temperature was 67½°. The highest was 72°, the lowest 64°, neither of which extremes was reached more than once.

Remarkable as this uniformity from day to day appears, the equality of temperatures at the top and bottom of the room is still more worthy of note. Though the audience was trebled in one room and increased tenfold in the other, the thermometers at the floor and at the ceiling never differed more than 3½° Fahr.

It might be supposed that results so successful were attained only by the employment of attendants of great skill and experience. On the contrary, the furnace and ventilating apparatus were managed by the regular porter whom Gen. Morin describes as of the ordinary intelligence and faithfulness of his class. He adds: "After a very few days, the attendant became so familiar with the management of the apparatus that whatever the number of the audience or the exterior temperature,

e succeeded in limiting the range of the interior temperature etween 65° and 70° Fahr."

Many large buildings are warmed with air heated by passing ver two or three coils of steam-pipe. In such cases too great eat could easily be avoided by the use of valves to shut off the team from one or more of the coils of pipe, leaving the fresh ir to flow unchecked. This plan avoids entirely the fault of hutting the register in a school-room, thus excluding the fresh air as well as the heat.

If the common furnace is used, great care should be taken to manage the fire so as not to throw the dangerous gases from hard coal into the air-chamber, whence they will inevitably be carried into every room. The valve in the smoke-pipe often causes much harm in this way, when it is used to check the draught; the draught itself should not be checked too soon or too much, lest the coal be burned without giving out its proper amount of heat, and the poisonous carbonic oxide be evolved from it. Mistaken economy is often the unsuspected cause of the trouble from gas in houses and school-rooms.

Can we plead too strongly for a thoughtful consideration of this subject? Fresh air is not a luxury, not even an essential comfort, but an absolute necessity for the children. The duty of providing it is imperative. The cost is to be counted a trifle in proportion to the good to be gained. We build our walls tight and strong to keep out the cold, and then complain that we must pay money for fresh air, the most bountiful gift of nature. Let the school-houses at least be planned and built, in the first instance, with free channels for the air to come and go, then the item of ventilation will make small show in the construction accounts. When the blessing of ventilation is fully understood, the most grumbling of tax-payers will admit that money spent for it was never better invested. Then shall it no longer be said that teaching is more wearing than any other profession requiring the same actual labor, but teachers and scholars shall work without over-fatigue or listlessness in their fresh, sweet school-rooms.

Explanation of Wood-Cuts.

Nos. 1 and 2 show the plan and section of a small country school-house for fifty-six scholars. The room is heated by a stove, surrounded by an envelope. This casing will prevent the

direct radiation of the heat which makes the seats near by so uncomfortably warm. But its main purpose is to aid in heating the fresh air which comes in by a duct (marked A) made under the floor, with an opening beneath the stove. It is precisely similar to the "cold-air box" of a furnace, and should be made large and have a valve for regulating the supply of fresh air. The cold air from out of doors is thus warmed by the stove and rises up within the envelope to the top of the room, where it is diffused along the ceiling and thence is drawn down by the action of the ventilating ducts. Of these there are four horizontal ones, shown by the dotted lines. They may be made between the floor timbers, and should be as smooth as possible, with the angles rounded where a change of direction is necessary. Each of them has four inlets (shown by the pairs of curved arrows), making for the room sixteen outlets for foul air. These openings into the ducts should be protected by a raised hood placed under the seat with a wire guard over it (see figure 7). Moreover the ducts should have partitions under each opening (see figure 8), to insure a flow of air through each of them. These ducts are all connected with the vertical shaft at B. The smoke-pipe from the stove is carried up through its whole height so that the heat radiated from it may be utilized in rarefying the air in the shaft, in order to help the draught.

The sizes of foul air registers, ducts and shaft, are calculated as follows:—

There are fifty-six scholars, each requiring fifteen cubic feet of air per minute, which makes for the whole room, 840 cubic feet, or fourteen cubic feet per second. For ventilation in early fall or late spring, when it is too warm for fires and too cold for open windows, we can obtain a velocity of three and a half feet per second in the shaft by the aid of a small stove placed in the bottom of it. Therefore the shaft must have a cross-section of four square feet, in order at that velocity to draw off the required fourteen cubic feet per second. Each horizontal duct must pass one-quarter of fourteen cubic feet per second, or three and a half cubic feet, with a velocity of about two and a half feet per second. A cross-section must then be one and one-fourth square feet, or twelve by fifteen inches. Each foul-air register will be required to pass one-fourth of three and a half cubic feet per second with a velocity of two feet. Its area must then be .4375 square feet,

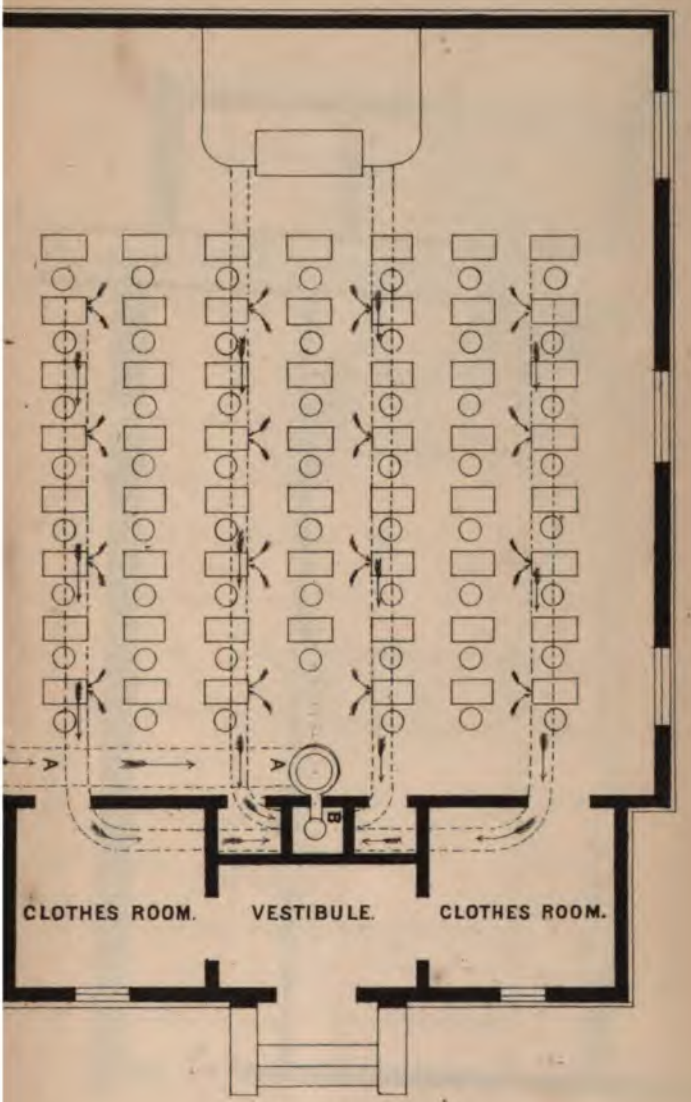
ual to sixty-three square inches or eight by eight inches. e outflow of air can be increased or diminished by the use a valve in the shaft by which its withdrawing power can be ntrolled. In case more fresh air is required than that sup- ed through the envelope of the stove, when the valve in the sh-air duct is wide open, openings (C) are made through the ling into the attic in which is a window (D) which can be sed and lowered by means of a cord below. The drawing wer of the ventilating shaft will at once determine an influx cold air which should be directed and diffused along the ceil- g. Should a furnace be used to heat such a room, the ducts withdrawing the air should be precisely the same as in the an. The hot-air flues should be carried up to the ceiling with ssages for cold air beside them in order to temper the heat if sired. See figure 6. The valve can be held by the cord in y position required, so as to admit all cold or all hot air or y proportion necessary. (The figure shows the cold air tirely cut off.) The power of the current in the vertical aft will secure the upward flow of the cold air.

Figures 3, 4 and 5 represent the basement and first and sec- d stories of an eight-room school-house. In such a building ere is generally a large hall in the third story which prevents rrying the vertical ducts up through the roof; therefore it is ore convenient to carry the foul air down into the basement ducts connected with a ventilating chimney (see Gen. orin's experiments, above), which should be large enough to ntilate the whole building, including the large hall. Fig. 3, ows the secondary collecting ducts under the basement floor, d their connection with the bottom of the chimney.

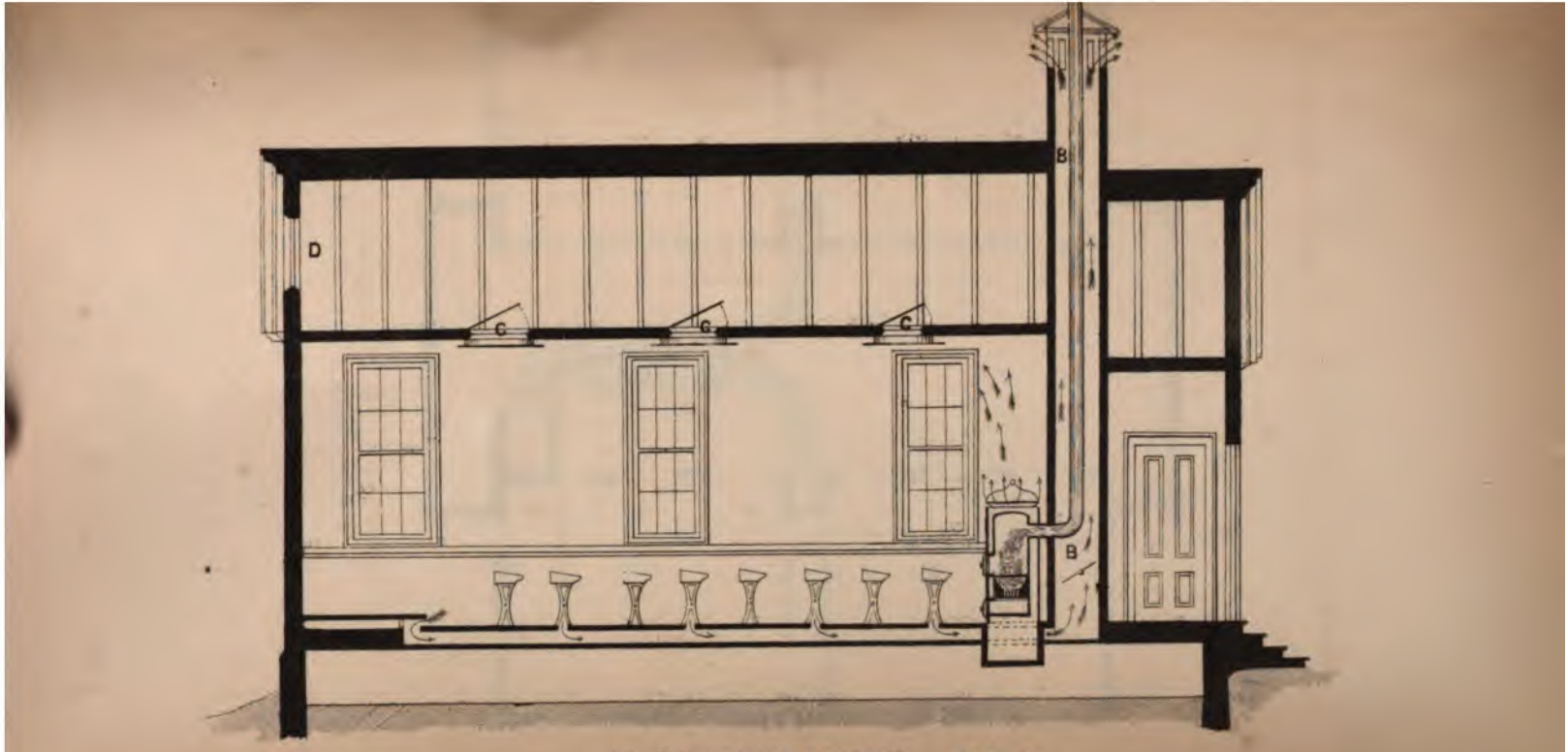
The calculations for this case are precisely like those for one om. The minimum velocity of the flow of air in the chimney ould be about six feet per second. It may be increased by eam coils or a fire in the bottom to nine, or, in cold weather, en twelve feet per second.

In room M, Fig. 4, the horizontal ducts are shown with the ul-air registers. Room N shows the distribution of the fresh r through a hollow cornice made for the purpose. Room O ows the position of the desks.

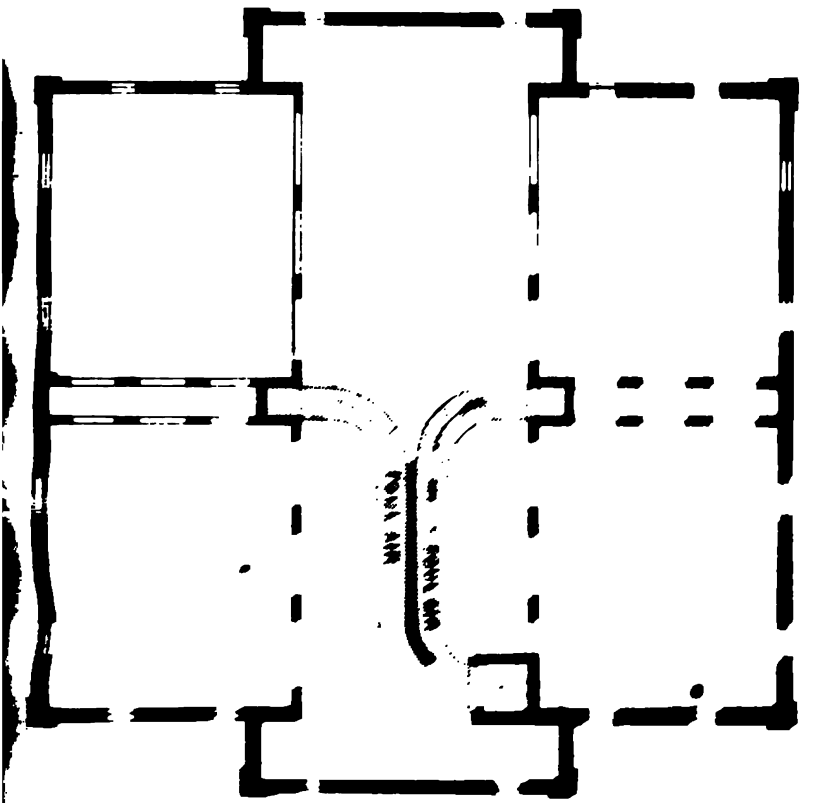
Fig. 5. is a section taken on the line X—Y of the plan, and ows the primary and secondary collecting ducts and the main aft.



PLAN FIG. I.



LONGITUDINAL SECTION: FIG. 2.





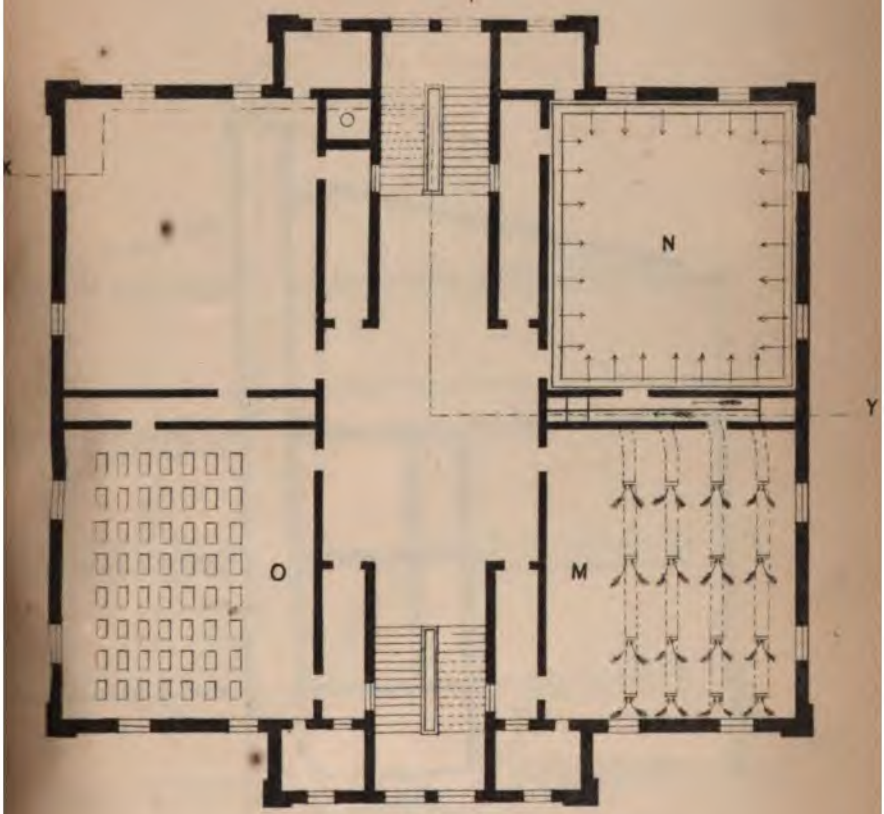


FIG. 4.

PLAN OF 1ST AND 2ND FLOORS.

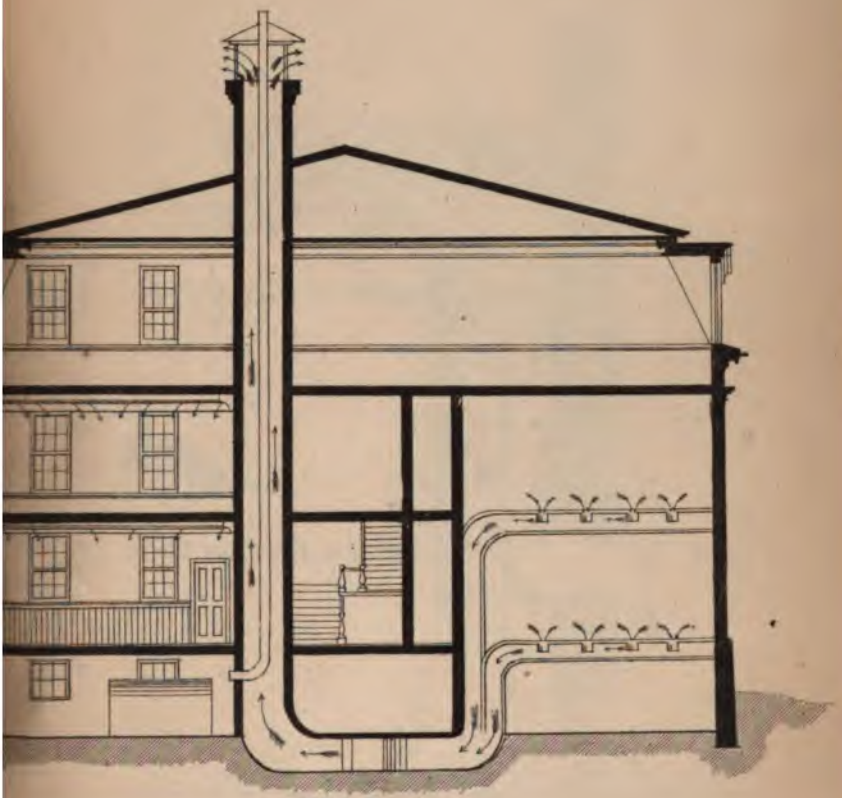
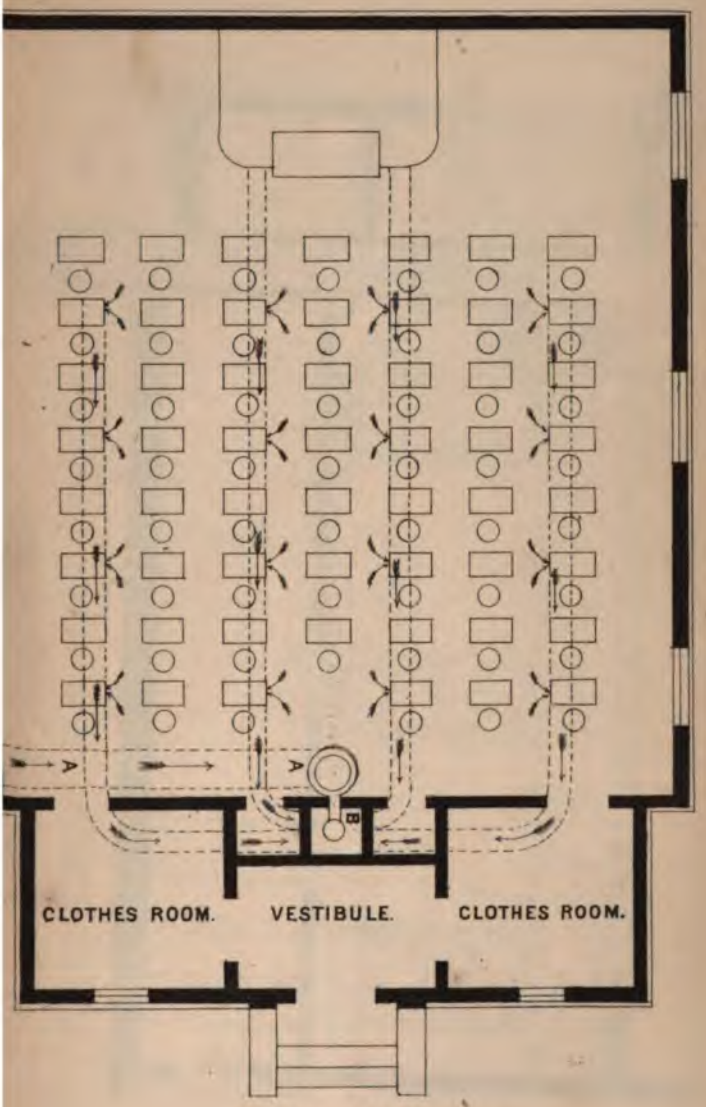
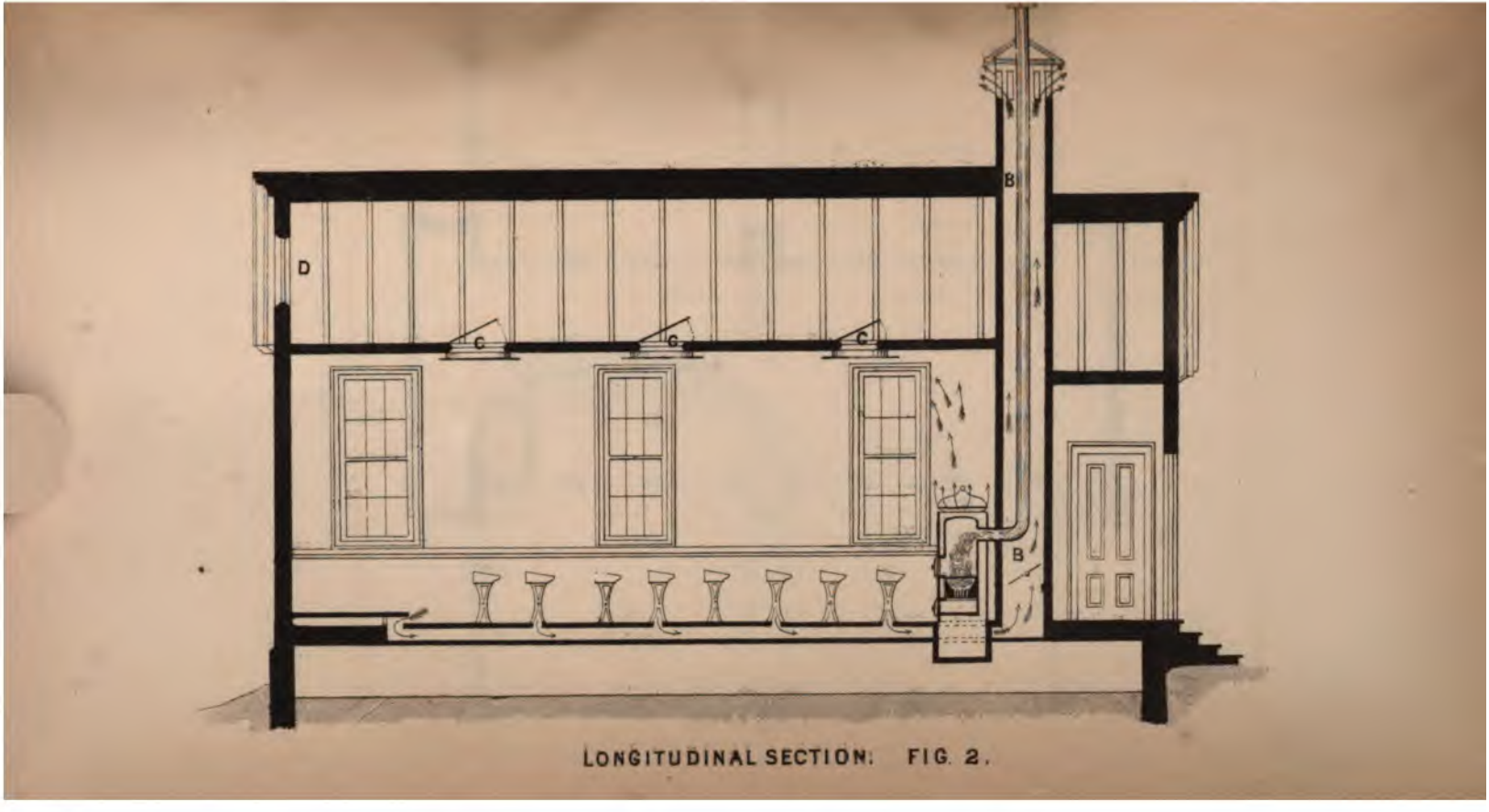


FIG. 5.

TRANSVERSE SECTION.



PLAN FIG. I.



LONGITUDINAL SECTION. FIG. 2.

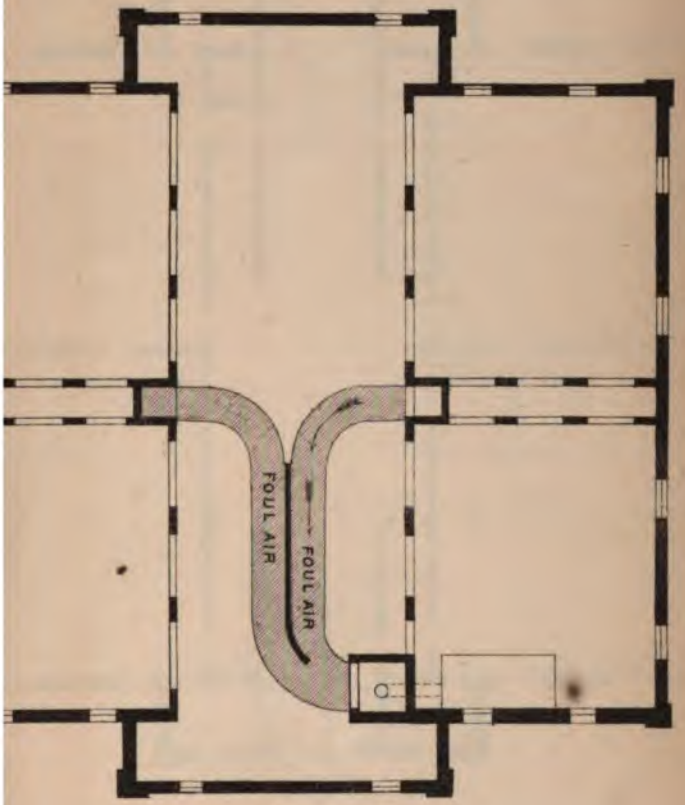


FIG. 3.

PLAN OF BASEMENT.

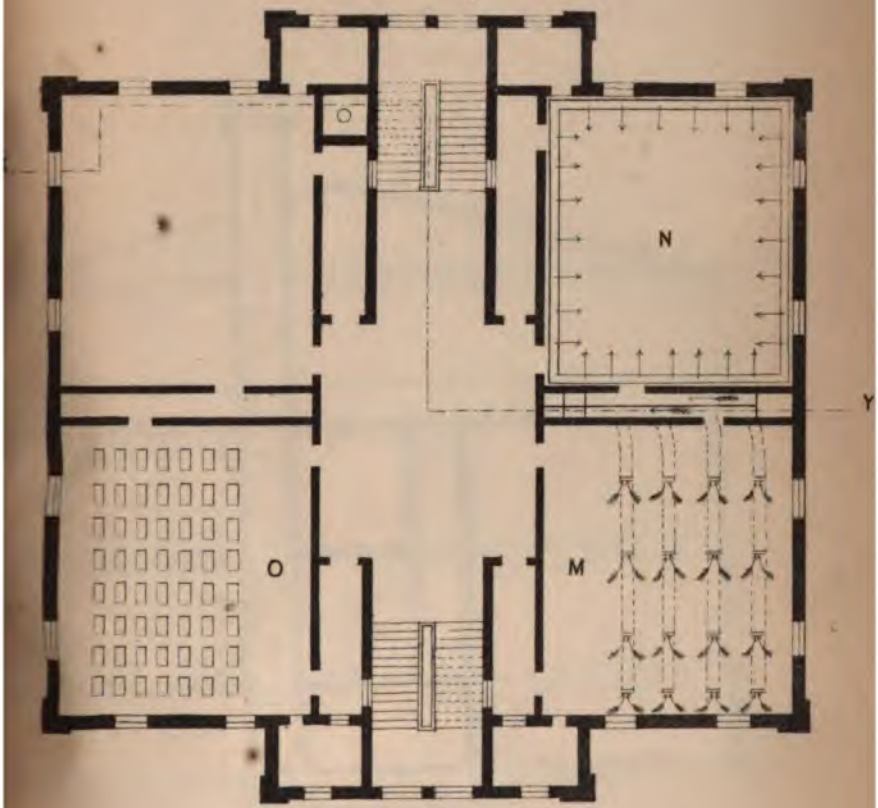


FIG. 4.

PLAN OF 1ST AND 2ND FLOORS.

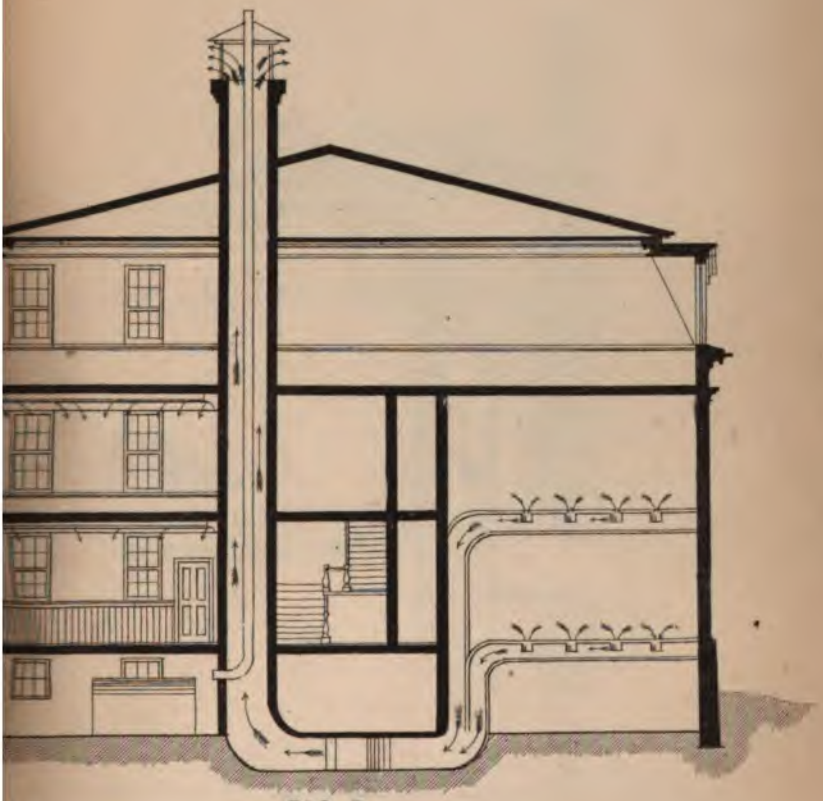
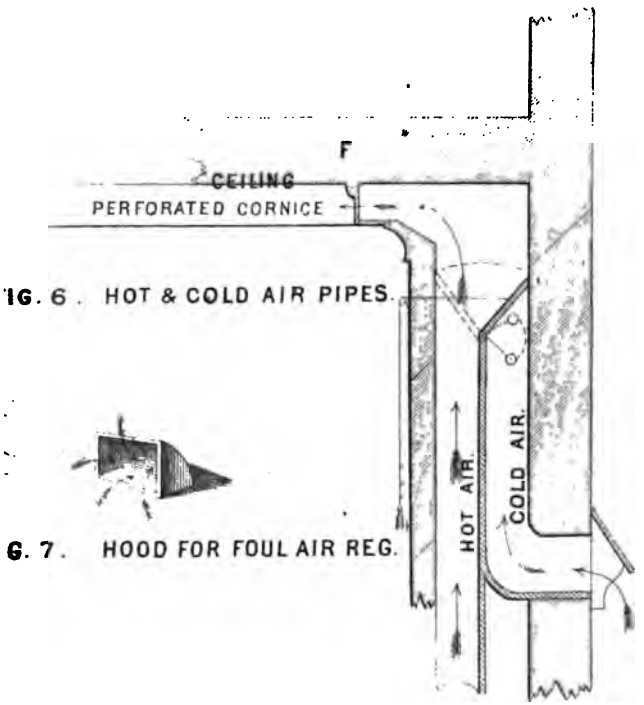


FIG. 5.

TRANSVERSE SECTION.





IG. 6. HOT & COLD AIR PIPES.

G. 7. HOOD FOR FOUL AIR REG.

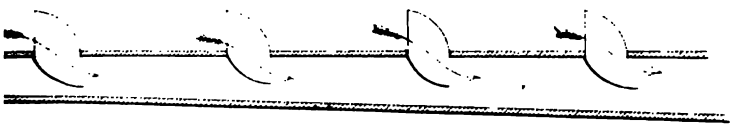


FIG. 8.

HORIZONTAL DUCT

THE WATER OF MYSTIC POND

AND ITS

SOURCES OF SUPPLY.

49

EXAMINATION OF THE WATER OF MYSTIC POND AND OF ITS SOURCES OF SUPPLY.

The pollution of streams by industrial establishments and by the sewage of towns, has been several times during the past year brought to the notice of the State Board of Health.* Judging from the history of still more densely populated manufacturing districts in other parts of the world, the general subject will continue to claim the attention of the people of Massachusetts for many years to come. As the interests of life and health become more definite and more valued, and as manufactories and population grow and multiply, the apparent conflict in this respect between health and industry will yearly become more evident. It is our duty, if possible, to show that these important interests are not irreconcilable, and to give a word of warning in season to prevent their relations from being forgotten until it is too late to remedy the omission except at enormous cost.

It was thought best, for the present year, to take a single instance of alleged pollution of a stream, and examine it thoroughly. The selection of Mystic Pond and the sources of its supply was made chiefly in consequence of information received from a gentleman familiar with the locality, who requested us to investigate the "condition of the streams and ponds in the town of Woburn as affecting its inhabitants, and also the supply of the Charlestown water-works. The chief occupation of Woburn is that of tanning, and many of the establishments are placed near to some small stream which receives the filth from the beam-house where the hides are scraped and cleaned. These streams flow southward through Winchester, and supply the Mystic Pond and Charlestown water-works. There are also two glue factories, and a bone-

* At Stoneham and Melrose as well as at Woburn.

boiling establishment, which are far worse than the tanneries. The offensive odor of one of these streams has often been a source of complaint among those inhabitants who live south of Railroad Street, in a thickly-settled part of the town. This nuisance may be remedied without pecuniary loss, for the filth of these brooks may all be used as a fertilizer, by being collected in vats at the tanneries. This has already been done at one large establishment in Winchester, the tank being cleaned out often, and its contents distributed upon neighboring farms."

Our correspondent also refers to the foul condition, at times, of Horn Pond, the waters of which flow into Mystic Pond; but, as will subsequently appear, they were not so found during the past summer.

The chemical examination of the waters of Mystic Pond and its tributaries was committed to Mr. William Ripley Nichols, Assistant Professor of General Chemistry at the Massachusetts Institute of Technology. In company with Mr. Nichols, the Secretary visited and selected the points at which specimens of water were taken on the first of April. A second set of specimens was taken on the ninth of August, after a drought so prolonged that some of the smaller streams of April 1st had disappeared. The report of Mr. Nichols is as follows:—

MASS. INSTITUTE OF TECHNOLOGY,
BOSTON, September 15th, 1870.

GEORGE DERBY, M. D., *Secretary of Mass. State Board of Health:*

DEAR SIR:—The examination of the waters supplying Mystic Pond was made at two different dates. The first set of specimens was taken April 1st, 1870. The description and locality of these waters, which are denoted by *Arabic* numerals in the Table, are as follows:—

No. 1.—A sample taken from a brook in North Woburn, about half a mile above Eaton's Chemical Works, at a point where the brook crosses the Lowell Railroad. Yellow.

No. 2.—From the same stream, just below the chemical works. Colorless.

No. 3.—From the surface of Horn Pond at its outlet. The pond was full and a rapid current setting out. Slightly turbid. No disagreeable odor or taste.

No. 4.—From a small stream draining a number of tanneries and emptying into the outlet of Horn Pond, at some distance from the

pond. The sample was taken at a point near its junction with an outlet, where the stream was flowing over numerous rocks, producing much foam. A disagreeable odor was apparent in its vicinity.

No. 5.—From the upper end of the reservoir, near "Bacon Bridge."

No. 6.—At the dam opposite Whitney's Machine-shop, Winchester.

No. 7.—From the same stream as No. 4, as it issues from the Cummings Tannery, where it is scarcely more than a drain. There was a rapid flow.

No. 8.—Mystic water drawn in Charlestown, April 5th.

No. 9.—Cochituate water drawn in the Laboratory of the Institute of Technology.

The second collection was made August 9th, after a very long period of dry weather. The ponds were moderately low and covered near their margins with a growth of aquatic plants. We observed no *green scum* or unpleasant odor. The draining stream from which Nos. 4 and 7 were taken in April, was perfectly dry. These samples, indicated in the Table by *Roman* numerals, were as follows:—

No. I.—From a brook in Cummingsville, Woburn, above Bacon's Patent Leather Factory. Small brook in a cow-pasture, with little flow.

No. II.—From the same stream near its entrance into Horn Pond. The ground much marshy near the brook, and considerable cow-dung; slightly affects the water clear.

No. III.—From Horn Pond. Same locality as No. 4. From pond-hole, slightly turbid.

No. IV.—From a stream in East Woburn, at the place where crosses Washington Street. Quite clear.

No. V.—From Whitney's Machine-shop. The water [illegible] as No. 6.

No. VI.—From Bacon's Bridge. Same as No. 5.

No. VII.—[illegible]

No. VIII.—[illegible]

No. IX.—[illegible]

No. X.—The same.

No.	LOCALITY. (See description preceding.)	DATE.	No. of cubic centimetres of permanganate to a litre.	No. of cubic centimetres solution to 100 cubic cent. of water.	SOLID RESIDUE AT 100° C.		LOSS ON GENTLE IGNITION.		CHLORINE.		Reaction for Nitrites.	Reaction for Sulphates.
					Parts in 100,000.	Grains in U. S. Gallon.	Parts in 100,000.	Grains in U. S. Gallon.	Parts in 100,000.	Grains in U. S. Gallon.		
1.	Brook, North Woburn,	April 1,	27.7	2.75	3.59	2.10	1.35	0.79	Slight,		None.	Very slight.
2.	Same, below Chem. Works,	1,	22.4	5.1	11.16	6.51	1.32	0.77	Decided,		None.†	Very decided.
3.	Horn Pond,	1,	16.8	4.9	6.9	3.55	1.67	0.97	Moderate,		Very slight.	Very slight.
4.	Tannery Stream,	1,	30.0	9.3	18.46	10.77	3.23	1.88	Very decided,		Distinct.‡	Decided.
5.	Bacon's Bridge,	1,	18 2	4.0	–	–	–	–	Slight,		Slight.	Slight.
6.	Whitney's Machine Shop,	1,	15.8	3.5	–	–	–	–	Slight,		Slight.	Slight.
7.	Tannery Stream,	1,	35.6	–	–	–	–	–	Very decided,		–	Very decided.
8.	Mystic Water, Charlestown,	5,	14.8	5.85	7.38	4.30	1.95	1.13	Moderate,**		Slight.§	Very slight.
9.	Cochituate,	2,	17.4	4.00	–	–	–	–	Slight,**		Very slight.‖	None.
		5,	16.8	–	–	–	–	–	–	–	–	–
I.*	Cummingsville,	Aug. 9,	5.6	4.2	6.30	3 68	1.62	0.95	0.673	0.393	None.	–
II.	Horn Pond Inlet,	9,	10.5	6.9	13.48	7.87	2.84	1.66	3.215	1.819	Distinct.	–
III.	Horn Pond (3),	9,	16.4	5.9	8.58	5.1	2.40	1.40	1.673	0.977	None.	–
IV.	East Woburn,	9,	21.7	5.5	–	–	–	–	1.154	0.674	None.	–
V.	Whitney's Machine Shop (6),	9,	20.4	6 6	9.14	5.34	2.54	1.48	1.942	1.134	None.	–
VI.	Bacon's Bridge (5),	9,	19.4	6.8	10.42	6.8	3.00	1.75	1.981	1.156	Slight.	–
VII.	Mystic, Charlestown (8),	13,	11.4	–	8.00	4 67	2.20	1.28	1.654	0.965	None.	–
VIII.	Cochituate Lake,	31,	–	–	6.66	3.88	–	–	–	–	–	–
IX.	Cochituate, Boston,	10,	–	3.8	–	–	–	–	–	–	–	–
X.	Cochituate, Boston,	Sept. 15,	–	–	–	–	–	–	0.372	0 217	–	–

* Between Nos. I. and II. there is a morocco factory.

** Compare with Nos. VII. and X.

† Slight reaction for phosphates.

‡ Slight reaction for phosphates; moderate reaction for nitrates.

§ Slight reaction for nitrates.

‖ Very slight reaction for nitrates.

Explanation of the Table.

The results are calculated both in terms of parts in 100,000, and of grains in a United States gallon of 58372.1754 grains (2 cubic inches), with the exception of those in the first two columns which are to be regarded simply as *comparative.*

The *permanganate* test was applied to the waters the day after they were collected, by adding to the water, after acidulation with sulphuric acid, a dilute solution of permanganate of potassium until a red color was produced which lasted ten minutes. [1,000 cubic centimetres of this solution oxidized 0.63 gram. crystallized oxalic acid.] For this test and for the determination of the dry residue, the waters were allowed to settle and were then drawn off from any sediment.

The *hardness* was determined by adding to 100 cubic centimetres of the water a dilute alcoholic solution of soap, until a permanent froth (lasting three minutes) was obtained. [34.2 cubic centimetres of the soap solution were required for 100 cubic centimetres of a solution containing 0.02775 gram. chloride of calcium.]

The test for nitrites was applied by adding to equal quantities (75 or 100 cubic centimetres) of the waters a drop or two of dilute sulphuric acid and a small quantity of iodide of potassium and starch; the amount of the blue coloration of the liquid was then observed.

In the second set of specimens, the chlorine was determined volumetrically by the use of a standard solution of nitrate of silver.

The map is traced from the "Map of Boston and its Environs," published by Baker and Tilden, Boston, 1867.

Respectfully submitted,

(Signed) Wm. Ripley Nichols.

The conclusions reached by this investigation may be thus expressed:—

The permanganate test, showing the comparative amounts of readily oxidizable material contained in the water, is of a certain significance as marking the impurity of the tannery stream of April 1st, Nos. 7 and 4. Even at the latter point, where the current was swift and broken, it had not cleared itself of the foul character acquired a half mile above. But the permanganate test alone is not conclusive, since oxidizable substances in water may not be harmful, and we see this in the amount

nd present in the specimen taken from the brook in the ods of North Woburn (No. 1) above all the sources of pol- ion. It was here due without doubt to vegetable matter ived from the banks or from fallen leaves. Horn Pond and Winchester reservoir show no foulness by this test; al- ugh it will be observed that the amount of permanganate uired increases in the second examination all the way along m Cummingsville to the reservoir. Here it requires less, d at Charlestown the water is found in this respect to be en more free from oxidizable material than the water of oston.

The test for nitrites indicates the amount of nitrogenous natter undergoing decomposition; and the test for nitrates the mount of the same material which has undergone complete xidation. The tannery stream (Nos. 7 and 4, April 1st) and he inlet of Horn Pond give evidence of the presence of such mpurity.

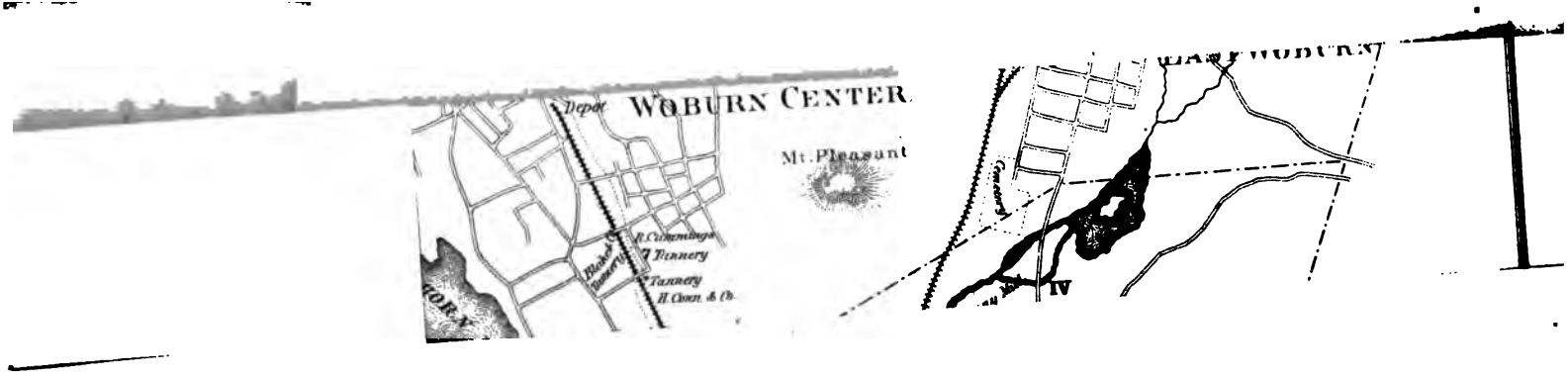
As regards chlorine, it is agreed by chemists that all waters ear the sea must contain a certain proportion. It is conveyed n the air in the form of common salt and deposited upon both arth and water. A familiar evidence of this general fact is ound in the greater need of supplying salt to animals in the land districts. It is also not improbable that Mystic Pond ay contain some traces of sea-salt left by the ocean when it ad access to its waters.

With these reservations the presence of any but minute mounts of chlorine may be taken as evidence that it has been aused by some form of impurity added to the water by man.

Chlorine increases quite steadily in amount from Cummings- ille to the reservoir; the great and exceptional increase at the nlet of Horn Pond being due to the morocco factory just bove. In the reservoir, uniting with other sources of supply, is diluted, so that, when it reaches Charlestown, the amount found to be about the same as at the outlet of Horn Pond,— onsiderably greater than in the Boston water.

The soap test is of practical value as denoting the amount f lime salts, or of other salts which harden the water.

Finally, it may be said that in so far as the Mystic water as elivered at Charlestown is concerned, the fears naturally enter- ained by those who were familiar with the foul conditions


Depot
WOBURN CENTER
Mt. Pleasant
R. Cummings
Tannery
Tannery
H. Conn. & Co.



AIR, AND SOME OF ITS IMPURITIES.

AIR, AND SOME OF ITS IMPURITIES.

No one can study the causes of disease without being convinced of the infinite importance of pure air to the preservation of health. This general truth meets us at every turn. Sometimes, as in the case of air spoiled by respiration, the reason is obvious enough to every one who understands the changes which take place in breathing; certainly, in so far as the interchange of oxygen and carbonic acid is concerned.

In other cases, as when air seems to be the vehicle for the transfer of the hidden poison of the zymotic diseases, it is, as yet, obscure. We do not propose, at present, to enter on this dangerous (because, as yet, partly hypothetical) ground. Allusion to it will be found in many pages of the present volume. Indeed, in any study of the causes of disease, at the present day, it is impossible to ignore it, however anxious we may be to keep within the strict bounds of scientific truth. In some way, as yet but imperfectly understood, the organic matter in air seems either to be or to contain the agent by which certain changes are impressed upon the blood in the lungs, which changes become the proximate cause of the phenomena of typhoid fever, and scarlet fever, and measles, and many other of our most destructive maladies. Whether this organic matter be waste tissue which has once had life and has now undergone some metamorphosis incident to decay, or whether it be living organism, seed, germ, spore or vital radicle of any sort, no one yet knows, or perhaps we should say, that no one who thinks he knows can yet prove his knowledge. The search for this foe to our health, for this hidden something which works with such fatal power, is keen. The chemists, the microscopists, the natural philosophers are all aiding in the study of its origin, its character, and the means of separating it from the air which all believe conveys it. It has even become, through the

popular teachings of Professors Tyndall and Huxley, a subject of rather general discussion during the past year. It should, however, never be forgotten that it is to the unobtrusive labors of men devoted to science like Dr. R. Angus Smith of England, labors pursued unremittingly for a quarter of a century, and modestly published in scientific reports, that we know all, or nearly all which is available in speculations on this obscure subject. The eloquent men who have recently interpreted the facts of Angus Smith and Pasteur and Beale and Hallier and Sanderson to the general public in a way to arrest the attention of the busy world, have in this respect done good service, but they have added almost nothing to the stock of existing knowledge.

We would gladly contribute our proportion of exact observation, however small it may be, to this great subject so full of interest and promise.

During the present year, careful note has been made of the proportion of carbonic acid contained in the air of enclosed places of various sorts, and also of the outer air at different seasons of the year. We hope to continue this line of research in future years, and, by the aid of chemists and microscopists, to determine the amount of organic matter which the air may hold under various circumstances, and to learn, if possible, something of its nature.

Although carbonic acid is not now generally regarded as a poisonous gas, but rather as an obstructor of respiration, and therefore impeding all vital processes, its amount in crowded and ill-ventilated rooms is a tolerably correct measure of the degree of impurity there present, and is specially worthy of observation as an index of the proportion of dangerous material coming from the waste of the body, with which, under such circumstances, it is always associated.

The amount of carbonic acid found in the fresh outer air will furnish a standard of the quality of the normal air of Massachusetts, and may also lead to a better knowledge of some of the peculiarities of the climate of our State in comparison with that of other countries.

In illustration of the value of the determination of very small amounts of impurity in air, we quote the following remarks of Dr. R. Angus Smith, from a paper on "Chemical

Climatology," in the *Scottish Meteorological Journal*, January, 1870:—

"Some people will probably inquire why we should give so much attention to such minute quantities,—between 20.980 and 20.999 of oxygen,—thinking these small differences can no way affect us. A little more or less oxygen might not affect us, but supposing its place occupied by hurtful matter, we must not look on the amount as too small. Subtracting 0.980 from 0.999 we have a difference of 190 in a million. In a gallon of water there are 70,000 grains; let us put into it an impurity at the rate of 190 in a million; it amounts to 13.3 grains in a gallon. This amount would be considered enormous if it consisted of putrefying matter, or any organic matter usually found in waters, but we drink only a comparatively small quantity of water, and the whole thirteen grains would not be swallowed in a day, whereas we take into our lungs from one thousand to two thousand gallons of air daily. The detection of impurities in air is, therefore, of the utmost importance; and it is only by the finest methods that they can be ascertained in small quantities of air, even when present in such quantity as to prove deleterious to health." * * * * * * "If, by inhalation, we took up at the rate of thirteen grains of unwholesome matter per day,—half a grain per hour,—we need not be surprised if it hurt us. Such an amount is an enormous dose of some poisons, and yet this is not above one two-thousandth part of a grain at every inhalation. It is marvellous what small amounts may affect us, even when, by repeated action, they do not cumulate as certain poisons do. The carbonic acid numbers might have been used for this illustration, instead of the oxygen numbers, with the same result."

The examinations of air for carbonic acid were made at the Massachusetts Institute of Technology, under the direction of Professor Frank H. Storer, by Mr. A. H. Pearson of Haverhill. The results are as follows:—

I.—Outer Air, in Boston.

Locality.	Percentage of Carbonic Acid, by Volume.	Date—1870.	Time.	Temperature. Centigrade.	Barometer. Inches.	Remarks.
				Deg.		
Newbury Street, near Institute Technology,	.04560	Mar. 17,	11.00 A. M.,	—3.5	29.330	Cloudy, wind N. W.
	.03194	Apr. 1,	8.45 "	9	30.372	Clear, wind N. E.
	.03894	1,	8.45 "	9	30.372	" "
	.03988	8,	9.40 "	13	30.134	" "
	.04449	8,	9.40 "	13	30.134	" "
	.04218	8,	9.40 "	13	30.134	" "
	.03798	13,	11.00 "	14	30.000	Clear, wind N.
	.04435	13,	11.00 "	14	30.000	" "
	.04230	14,	2.35 P. M.,	25	30.016	Clear, wind S. W.
	.04292	14,	2.35 "	25	30.016	" "
	.04999	28,	2.20 "	28	29.872	Cloudy, wind S. W.
	.04903	28,	2.20 "	28	29.872	" "
Park Street, near Tremont,	.04493	May 3,	8.30 "	14	29.936	Clear, wind N.
Newbury Street,	.03394	12,	2.45 "	22	29.852	After storm; light clouds; wind S. W.
	.03561	12,	2.45 "	22	29.852	After storm; light clouds; wind S. W.
Public Garden,	.02905	17,	10.45 A. M.,	14	30.170	Cloudy, wind N. E.
	.03563	18,	4.05 P. M.,	22	30.336	Clear, wind S. W.
	.02969	19,	10.50 A. M.,	25	30.244	" "
	.02586	30,	3.40 P. M.,	20	30.264	Clear, wind S. E.
Cupola of State House,	.03139	18,	3.15 "	20.5	30.336	Clear, wind S. W.
Clarendon Place, near Berkeley Street,	.03371	19,	1.30 "	28	30.212	" "

II.—Rooms at the Massachusetts Institute of Technology.

Locality.	Percentage of Carbonic Acid, by Volume.	Date—1870.	Time.	Temperature. Centigrade.	Barometer. Inches.	Remarks.
				Deg.		
Small "weighing-room," Laboratory Institute Technology,	.13205	Mar. 15,	3 00 P. M.,	22	30 190	– –
	.13041	15,	3.00 "	22	30.190	– –
Drawing-room, Second Year, Institute Technology,	.08836	16,	9.40 A. M.,	14	29.760	Wind N. E.
	.08416	16,	9.40 "	14	29.760	" "
	.05693	16,	5.00 P. M.,	15	29.760	" "
Room 11, after recitation, Institute Technology,	.05551	16,	5.00 "	15	29.760	" "
	.09762	17,	1.15 "	21	29.330	– –
	.08929	17,	1.15 "	21	29.330	– –

III.—Air of School-Rooms in Boston.

Grammar Schools.				Deg.		
Myrtle Street,	.13431	Mar. 24,	10.25 A. M.,	23	30.200	– –
	.13659	24,	10.30 "	23	30.200	– –
Dartmouth Street,	.12012	25,	10.30 "	18	30.430	– –
Hawkins Street,	.09748	29,	10.20 "	21	29.906	– –
Tremont Street,	.14335	29,	3 00 P. M.,	23	29.950	– –
Waltham Street,	.12111	29,	3.30 "	18	29.950	– –
Common Street,	.17686	30,	10.05 A. M.,	18	30 260	– –
West Springfield Street,	.10164	31,	10.25 "	21	30.306	– –
Blossom Street,	.19087	Apr. 5,	10.30 "	22	29.900	– –
North Bennet Street,	.17887	6,	10.15 "	18	29.920	– –
Richmond Street,	.17781	11,	10.10 "	20	30.196	– –

Anderson Street,	.08570	Apr.	12,	10.10	A. M.,	23	29.648	- - - -
Northampton Street,	.18622		18,	10.10	"	22	29.982	- - - -
Tyler Street,	.12586		18,	3.35	P. M.,	20	29.850	- - - -
South Street,	.17598	May	10,	10.15	A. M.,	23	30.114	- - - -
Primary Schools.								
Appleton Street,	.11092	Mar.	25,	3.15	P. M.,	20	30.460	- - - -
Hanover Street, (Station-house,)	.14296		28,	10.30	A. M.,	20	29.556	- - - -
110 Merrimack Street,	.18187		28,	11.15	"	20	29.556	- - - -
Poplar Street,	.11173	Apr.	5,	11.15	"	20	29.900	- - - -
North Bennet Street,	.16824		6,	10.25	"	20	29.920	- - - -
Richmond Street,	.08101		11,	10.20	"	22	30.196	- - - -
Phillips Street,	.08971		12,	10.20	"	22	29.648	- - - -
West Concord Street,	.13999		18,	10.25	"	21.5	29.982	- - - -
Tyler Street,	.11015		18,	3.50	P. M.,	19	29.850	- - - -
Newbern Place,	.15541		19,	11.35	A. M.,	23	29.796	- - - -
Warrenton Street,	.14575		19,	11.50	"	22	29.796	- - - -
Suffolk Street,	.10618		19,	3.35	P. M.,	22.5	29.750	- - - -
Cooper Street,	.19927		21,	9.55	A. M.,	22	29.888	- - - -
Thacher Street,	.17292		21,	10.10	A. M.,	23	29.888	- - - -
Sheafe Street,	.18692		21,	3.40	P. M.,	22.5	29.856	- - - -
Snelling Place,	.16056		21,	3.55	"	19	29.856	- - - -
Genesee Street,	.16082		22,	9.50	A. M.,	23	30.050	- - - -
Way Street,	.12284		22,	10.15	"	23	30.050	- - - -
Groton Street,	.14507		25,	11.20	"	20	30.092	- - - -
Rutland Street,	.11663		25,	11.45	"	22	30.092	- - - -
Hudson Street,	.13024	May	9,	3.40	P. M.,	18	29.856	- - - -
Common Street,	.07732		9,	3.55	"	18	29.856	- - - -
East Street,	.16988		10,	10.05	A. M.,	22.5	30.114	- - - -
Chardon Street,	.09934		11,	10.15	"	22.5	30.034	- - - -
Blossom Street,	.12708		11,	10.50	"	21	30.034	- - - -

IV.—Air of Halls, &c., in Boston.

LOCALITY.	Percentage of Carbonic Acid, by Volume.	Date—1870.	Time.	Temperature. Centigrade.	Barometer. Inches.	Remarks.
				Deg.		
Music Hall, Tremont Street,	.14045	May 4,	4.05 P. M.,	25	29.576	- -
Low tenement-house, known as the "Crystal Palace," Lincoln Street,	.09530	17,	2.30 P. M.,	23	30.242	- -
Open air, in rear of above,	.03976	17,	2.50 "	15	30.242	- -
Hall of Y. M. C. U., 300 Washington Street,	.15239	Apr. 27,	9.05 "	26	30.060	- -
Municipal Court-Room, Court Street,	.12047	20,	1.30 P. M.,	23	29.784	- -
Office of Secretary of State, State House,	.08914	Mar. 22,	2.45 "	24	29.892	- -
Printing-Office, 79 Milk Street,	.16183	Apr. 4,	3.30 "	20	29 724	- -
Selwyn's Theatre,	.14438	11,	9.00 "	23	29.952	- -
St. Paul's Church,	.05929	15,	11.00 A. M.,	21	30.292	- -
Public Library, waiting-room,	.13666	Mar. 19,	2.30 P. M.,	20	30.150	- -
	.13747	19,	3.45 "	21.5	30.150	- -
	.19352	Apr. 20,	7.50 "	23	29.784	- -

NOTE.—The method employed in the above analyses was the one generally known as Pettenkofer's. It consists in acting upon a known volume of air, with a certain quantity of standard baryta-water, and so removing the carbonic acid as carbonate of baryta.

After acting upon the air for about half an hour, the baryta solution is poured into a cylinder, allowed to deposit, with exclusion of air, the carbonate of baryta which has been formed, and then the free baryta remaining in solution is determined with a standard oxalic acid solution.

The difference between the amounts of oxalic acid required to neutralize the baryta, before and after the operation represents the carbonate of baryta formed, and consequently the carbonic acid present.

The baryta solution is prepared by dissolving seven grammes of hydrate of baryta in one litre of water; one cubic centimetre of this solution corresponds to about one milligramme of carbonic acid. The precise strength of the solution is determined by means of oxalic acid as described below. In the above experiments 1.087 cubic centimetres of the baryta solution corresponded to one cubic centimetre of oxalic acid solution.

The oxalic acid solution is prepared by dissolving 2.8636 grammes of pure oxalic acid in water, and diluting the solution to the volume of one litre. One cubic centimetre of this solution corresponds to one milligramme of carbonic acid.

The strength of the baryta-water is determined by running the oxalic solution from a burette into a certain quantity of the baryta-water, until a drop of the mixture fails to give a brown ring on delicate turmeric paper.

It will be observed that all the examinations of air by Mr. Pearson were made in the spring of 1870.

Another series was made for the Board of Health in winter, when the average temperature of the outer air was at about the standard of our three coldest months—a little below the freezing point of water. The following record shows the results of examination of the outer air for carbonic acid made at the Laboratory of Harvard University, Cambridge, by Mr. H. B. Hill, Assistant in Chemistry.

While this Report is passing through the press Mr. Hill sends us also a record of three examinations of air for carbonic acid, made in a recitation room of Harvard College.

Outer Air, in Cambridge.

Locality.	Percentage of Carbonic Acid, by Volume.	Date— 1870.	Time.	Temperature. Centigrade.	Barometer. Eng. Inches.	Remarks.
				Deg.		
College Yard, 20 feet north of Boylston Hall,	0.0375	Dec. 29,	4.00 P. M.,	—5	29.457	Cloudy, snow during previous 24 hours.
	0.0376	30,	12.00 M.,	—9	29.973	Wind S. W., fair.
	0.0308	30,	4.00 P. M.,	—7	29.973	Wind S., cloudy.
	0.0344	31,	11.00 A. M.,	+3	29.665	Wind S. W., fair.
	0.0364	31,	2.00 P. M.,	+6	29.626	Wind S.
		1871.				
	0.0343	Jan. 2,	3.30 P. M.,	+4	29.649	Wind S. W., cloudy.
	0.0310	3,	11.00 A. M.,	0	30.063	Wind S. W., clear.
	0.0311	3,	2.30 P. M.,	—1	30.000	– –
	0.0331	4,	11.00 A. M.,	—5	30.240	Wind W., clear.
	0.0332	4,	3.30 P. M.,	—5	30.264	– –
	0.0333	5,	9.00 A. M.,	—3	30.158	Wind S. E., cloudy.

Air of a Recitation-Room,* Harvard College.

		1871.		Deg.		
Recitation Room of Boylston Hall,	0.0683	Jan. 10,	12.00 M.,	20	30.130	After one hour's recitation.
	0.0531	17,	5.00 P. M.,	20	30.028	After ¾ hour's recitation.
	0.0613	17,	6.00 "	24	30.028	After 1¾ hours' recitation.

* Air taken fifteen minutes after the recitation was over.

Mr. Pearson's twenty-one observations of the outer air of Boston in *spring* give an average of 385 parts of carbonic acid in a million. Mr. Hill's eleven observations of the outer air of Cambridge in *winter* give an average of 337 parts of carbonic acid in a million.*

In the forty school-rooms examined by Mr. Pearson, the average proportion of carbonic acid found was 1,393 parts in a million, or nearly four times the normal amount existing in the outer air. The highest was 1,993, and the lowest 773 parts in a million.

It would not be fair to regard these figures as representing the amount of ventilation in different schools, as the examinations were made sometimes near the close of a session, and sometimes immediately after a recess when the windows had been open. The weather would also greatly influence the activity of air currents. But the average may be taken as a correct statement of the quality of air in the Boston schools.

The following letter from Mr. Charles Stodder, of Boston, an accomplished microscopist, will show what he was requested to do for the Board of Health. Although his results are inconclusive and almost completely negative, it is thought right to publish an account of this honest effort to reach the truth.

The presence in air of objects too minute for identification, leaves the whole question open for future investigation and discovery. The molecular movement of particles devoid of life is clearly exhibited by Mr. Stodder to whoever will examine his specimens.

The examination of dust deposited on a beam eight or ten feet from the floor, in a large room at the Springfield Armory, shows how metals may be floated about in the air, and if metals surely anything else in particles equally minute.

* Dr. Angus Smith (1869) gives the following amounts of carbonic acid found in the open air in England:—

Hills above 3,000 feet high,	336	parts in a	million.
between 1,000 and 2,000 feet high,	334	"	"
below 1,000 feet high,	337	"	"
At the bottom of the same hills,	341	"	"
Streets of London, (summer,)	380	"	"
London Parks,	301	"	"
On the Thames, at London,	343	"	"
Manchester Street, (ordinary weather,)	403	"	"
During fogs in Manchester,	679	"	"

DR. GEORGE DERBY, *Secretary of the State Board of Health:*

DEAR SIR:—So much interest had been created in the medical profession and among microscopists, by the various reports of the microscopical investigation of the dust floating in the air, especially by the surprising results said to have been obtained by Mr. Dancer, of Manchester, England, as reported by Dr. Angus Smith, and by the widely published lecture of Prof. Tyndall, on "Dust and Disease," that it was with pleasure I received your request to search for the microscopic contents of the air of Boston.

Dr. Angus Smith obtained his examples by putting a small quantity of water into a large bottle, and shaking the bottle, repeating the process many times, with new volumes of air and the same water. This appeared to me to be an unsatisfactory mode, and I devised an apparatus by which I could pass some thousands of measured volumes of air through one volume of water, thus, as I then thought, completely washing the air which passed through. Yet when we reflect that the bubbles of air in the water, though they may be only the one-hundredth, or even half an hundredth of an inch in diameter, are of large size when compared with the particles of matter in the air, many of which are so small as one-one-hundred thousandth ($\frac{1}{100000}$) of an inch, we see that such may escape contact with the water, and thus elude observation. Still, the substances detained by the water are probably nearly all the larger particles, and representations in kind, if not in quantity, of those floating in the atmosphere.

My first experiment was made with filtered Cochituate water, which to the eye appeared perfectly clear and free from foreign matter. In this I found such objects as will be hereafter mentioned, but especially scaly particles of apparently organic origin, and numerous minute, translucent spherical or granular bodies,—such as I suppose Mr. Dancer called germs. Something created suspicion that the water was not pure. A little of it was evaporated on a glass slide, and examined with the microscope. It had left a deposit of the same scaly and spherical particles. Other observers had used distilled water. I procured some from two sources, which had been distilled some weeks, but kept with care; both proved more impure microscopically than the filtered water. This put a stop to experiments for several weeks until a new supply of fresh distilled water could be obtained. A friend prepared some expressly for me with the utmost care, with the best apparatus. To my surprise, a drop of this water, evaporated, left a deposit visible to the naked eye, and, under the microscope, showing (as you yourself have seen) abundance of the same scales and granules.

This result put an end to this mode of investigation, and throws a cloud of suspicion on all reported researches in this line, when water was the medium used.* My object in the use of water was, that if spores, germs or eggs were found, their development and growth might be watched, and, if possible, their nature might be ascertained, or at least it might be determined that they really were spores or germs, believing as I do, that mere particles of matter have been taken for organisms. Other modes of collecting the dust of the atmosphere are by taking the deposited dust of rooms, or by causing a current of air to impinge against a surface of glass smeared with glycerine, when a portion of the floating particles will be caught by the viscid surface. In these methods, we can judge of the nature of the dust only by its present appearance,—there will be no growth. Both of these methods I have tried, but not so extensively as is desirable; my observations have been entirely on the air in a room in Dover Street, and that of the yard attached, a locality tolerably free from the dust of the street, and with but little vegetation in the neighborhood. I have used a Tolles' microscope with object glasses of "unsurpassed excellence," magnifying from 250 to 1,200 diameters.

The dust collected in the yard varied but little in its contents from that in the room. I have found scales resembling dead epithelial scales, filaments of cotton, wool and flax, woody fibres, all abundant; some pollen grains, scales of moths' wings, hairs and parts of insects, starch grains, grains of inorganic matter, sand, &c. Such things are reported by all observers; besides, some of them report immense numbers of spores or germs. I find great numbers of particles; I cannot say that they are germs or are not, that they are organisms or are not, or even that they are organic or inorganic. Some observers have used a power of 250 or 300 diameters, perhaps poor quality at that, found something, and rushed to the printer. Any microscope shows objects (in such collections) too minute to be identified. Increase of "power" may identlfy them, if the instrument is a good one, but it only brings into sight another set, in the same category; another increase of power repeats the process with a third set, and so it may continue *ad infinitum*. I doubt if the best microscopes (inferior ones are out of the question) can determine whether a minute particle is, I will not say an organism, but whether it is organic matter. Some observers have apparently considered motion an evidence of life. Certain movements may be positive evidence, but there is a molecu-

* It is to be remarked that we know nothing concerning the special means employed by Mr. Dancer to secure the purity of water.—SEC'Y.

lar movement common to particles of inorganic (clay, chalk, &c.), as well as to organic matter which may be mistaken for life even by experts, and the particles themselves for animated beings. I have a slide of coagulated albumen which has been prepared and closed up for seventeen months; in this there may be seen, in the field of the microscope, at one view, thousands of minute globules (too small to be distinguished with a power of 200 diameters), in constant movement. There can be no life in the matter, yet numerous experts have seen it and pronounced it life, and only one recognized it for what it is. Such things should teach caution to investigators to be not hasty in pronouncing conclusions.

In workshops and manufactories, dust may be and is present in such quantity and quality as may be supposed capable of impairing health. As for example, I examined at your request the dust deposited in the polishing shop of the U. S. armory in Springfield. It is a fine black powder. I found in it a few vegetable fibres, a few apparently organic fragments and broken crystals; but two-thirds to three-fourths of it was particles of iron, in amorphous fragments and of various dimensions from 1–100 m. m. upward, and curved and irregular fibres and masses of iron, with sharp, jagged edges, from 5 to 15 m. m.; and some very minute perfect spheres, probably iron. It can hardly be doubted that continual breathing an atmosphere charged with *such* dust must be injurious, —but that belongs to the medical profession to decide, not to me.

I thought I might separate the iron of this dust from the other constituents, by means of a magnet. To my surprise, the magnet took the whole of the dust from a white paper, as completely as could have been done with a brush. As the iron is all that is really attracted by the magnet, is it probable that all the particles of the dust are sufficiently coated with oil to be adhesive, so that they all stick together. This suggests a means by which it is likely a large portion, if not all, of the dust may be separated from the air, and thus rendered harmless. Let permanent, or, by preference, electro-magnets be placed abundantly about the grindstones and polishing wheels, and the dust will adhere.

I have only to add my regret that I have been able to accomplish so little.

Respectfully yours,

(Signed) CHARLES STODDER.

BOSTON, Dec. 25th, 1870.

HEALTH OF MINORS

EMPLOYED IN

MANUFACTORIES OF COTTON, WOOLLEN, SILK, FLAX AND JUTE.

52

HEALTH OF MINORS.

The legislature of 1870 passed the following Resolve:—

"*Resolved*, That it shall be the duty of the Board of Health to specially ascertain and include in their annual report to the legislature on the whole number of minors employed in all the cotton, woollen, silk, flax, and jute manufactories in this Commonwealth, and the cause, amount and rate of mortality among them, and how it compares with the mortality of all other persons of the same age in this Commonwealth during the same periods of time, and how far the particular employment of such minors affects their general health as compared with the effects of other employments upon the general health of other persons of similar ages."

In compliance with this Resolve the State Board of Health made application to the Secretary of the "American-House Manufacturer's Committee," for a list of persons or corporations engaged in such manufactures.

This information was furnished in July, 1870, and on the 1st day of August, the following circular was sent to 636 persons or corporations. (After quoting the Resolve above referred to), "Will you have the kindness to furnish the State Board of Health with replies to the following questions:—

[It is necessary to classify the ages as between 10 and 15, and 15 and 20, in order to correspond with the returns of the Registration Reports and of the Census.]

1.—What do you manufacture?

2.—How many persons of both sexes of the ages of 10 to 14 years, both inclusive, were employed by you on the 1st of August, 1870?
What was the average number during the year 1870?

3.—How many persons of both sexes of the ages of 15 to 19 years, both inclusive, were employed by you on the 1st of August, 1870?
What was the average number during the year 1870?

4.—How many deaths occurred among those of both sexes employed by you in 1870, of the ages of 10 to 14 years, both inclusive?

Of these deaths how many were caused by—
Accidents from machinery?
Consumption?
Other diseases?

5.—How many deaths occurred among those of both sexes, employed by you in 1870, of the ages of 15 to 19 years, both inclusive?
Of these deaths how many were caused by—
Accidents from machinery?
Consumption?
Other diseases?

6.—What proportion of your employees of both sexes of all the above ages, remained in your service throughout the year 1870?

7.—What was the average length of service of your employees of both sexes, of all the above ages, during the year 1870?

[The object of the two preceding questions is to endeavor to ascertain in what degree the changes occurring among employees may affect the value of statistics of mortality.]

In addition to the above information, which we are required by the legislature to obtain, will you also give us replies to the following questions:—

8.—What was the percentage of absence from work on the part of your employees of all ages by reason of sickness in 1870?

9.—Which class of employees suffer least loss of time from sickness, those who live in tenements provided by you or those who live in tenements provided by others?

10.—Do those of your employees who have been in the United States less than one year suffer from sickness in a greater or less degree than others?

11.—In case of sickness, is it the duty of any one to see that no suffering is caused by neglect of proper attention?

12.—Do you endeavor to *prevent* sickness, by providing fresh air in the work-rooms and sleeping-rooms, and by supervision of cellars, sinks, privies, cesspools and pigsties?

13.—Do you limit the number of persons who shall occupy sleeping-rooms of a certain size?

14.—Do you guard against smallpox, by systematic vaccination?

15.—How many hours do you work in each week?

As the report of the State Board of Health must, by statute, be presented to the legislature in January, it becomes necessary that replies to the foregoing questions should be mailed to our address on the first day of January, 1871.

Very respectfully, your obedient servant,

GEORGE DERBY, M. D.,
Secretary of the State Board of Health.

On the 20th of December, 1870, the circular was again sent to all parties above referred to, together with stamped and directed envelopes for replies.

The result of this endeavor to obtain the information required by the legislature is seen in the following abstract. The list was made up January 11, 1871, and from that time to the present, (January 16), only three additional letters have been received.

ABSTRACT OF MANUFACTURERS' REPLIES

To questions addressed to them by the State Board of Health, by order of the Legislature.

Circulars were sent to			636
Cotton,	256		
Wool,	341		
Silk,	21		
Flax,	15		
Jute,	3		
		636	
Replies were received from		218	
Cotton,	97		
Wool,	106		
Silk,	5		
Flax,	8		
Jute,	2		
		218	
Returned by post-office,		23	
Returned by mill owners not manufacturing,		46	
Missent to manufacturers not of the above classes,		3	
			290
Not heard from,			346

[To avoid unnecessary repetition, a general reference is here made in the following tabular replies to the corresponding numbers of the questions on pages 410 and 411.]

Second Question.

	No. of Replies.	Having none under 15.	Aggregate No. employed under 15.	Average No.	Greatest No. in any one Mill.	Least No.
Cotton, . .	94	17	2,350	30.5	265	1
Woollen, . .	96	20	1,082	14.2	135	1
Silk, . . .	5	1	77	19.2	62	1
Flax, . . .	8	4	114	28.5	49	2
Jute, . . .	2	1	80	8.0	–	–
Total, . .	205	43	3,653	22.5	265	1

Average.

Cotton, . .	89	10	2,072	26.2	286	1
Woollen, . .	99	13	1,212	14.	125	1
Silk, . . .	5	1	66	14.	52	1
Flax, . . .	8	4	117	29.2	47	1
Jute, . . .	2	–	80	40.	50	30
Total, . .	203	28	3,457	20.2	286	1

Third Question.

	No. of Replies.	No. employing none under 20.	Aggregate No.	Average.	Greatest.	Least.
Cotton, . .	95	8	5,672	67.5	1,106	1
Wool, . . .	102	4	2,748	27.9	293	1
Silk, . . .	5	1	212	53.	109	1
Flax, . . .	8	–	269	33.6	125	4
Jute, . . .	2	1	78	78.	78	78
Total, . .	212	14	8,979	52.	1,106	1

Average.

Cotton, . .	93	2	5,956	65.4	1,100	1
Wool, . . .	100	2	2,859	29.2	315	1
Silk, . . .	5	–	204	40.8	100	2
Flax, . . .	8	–	283	35.4	146	3
Jute, . . .	2	–	108	54.	78	30
Total, . .	206	4	9,410	44.9	1,100	1

Fourth Question.

	Replies.	None.	1 each.	2 each.	Total.	Accident.	Consumption.	Other Diseases.	Total.
Cotton,	95	81	11	3	14	3	4	10	17
Wool,	102	100	2	–	2	1	–	1	2
Silk,	5	5	–	–	–	–	–	–	–
Flax,	8	8	–	–	–	–	–	–	–
Jute,	2	2	–	–	–	–	–	–	–
Total,	212	196	13	3	16	4	4	11	19

NOTE.—Many of the mills report no deaths in their employees during a long series of years. A considerable number say, moreover, that minors leaving their mills are lost sight of, and that whether they subsequently die, from disease or otherwise, cannot therefore be known.

Fifth Question.

	Replies.	None.	1 each.	2 each.	3 each.	4 each.	7 each.	Total.	Accident.	Consumption.	Other Diseases.	Total.
Cotton,	94	72	14	3	2	2	1	22	1	16	24	41
Wool,	104	94	6	2	1	1	–	10	1	6	10	17
Silk,	5	5	–	–	–	–	–	–	–	–	–	–
Flax,	8	7	1	–	–	–	–	1	–	1	–	1
Jute,	2	2	–	–	–	–	–	–	–	–	–	–
Total,	213	180	21	5	3	3	1	33	2	23	34	59

Sixth Question.

	Replies.	Reporting 100 per cent.	Reporting none.	Average per cent.
Cotton,	87	13	2	74.
Wool,	91	16	6	71.
Silk,	4	1	1	58.
Flax,	8	2	1	74.
Jute,	1	–	–	75.
Total,	191	32	10	70.*

* General average.

Replies to this question are given approximatively, the manufacturers reporting in some cases that they do not fully understand the question, in others that their records do not enable them to reply with accuracy, in others that they are unable to determine with greater precision; only a small minority give absolute answers.

Seventh Question.

	Replies.	Average Months.	Longest.	Shortest.
Cotton,	74	9	12	4
Wool,	80	9$\frac{1}{2}$	12	4
Silk,	3	8$\frac{2}{3}$	12	5
Flax,	5	11$\frac{1}{5}$	12	11
Jute,	–	–	–	–
Total,	161	9$\frac{8}{9}$	12	4

Eighth Question.

	Replies.	Average per cent.
Cotton,	54	2
Wool,	80	1$\frac{1}{2}$
Silk,	3	$\frac{3}{4}$ of 1
Flax,	5	$\frac{1}{2}$ of 1
Jute,	1	"Very small."
Total,	143	1$\frac{1}{12}$

The replies show considerable variation in the estimate of absence, the extremes being 5 per cent. and 0. The great majority admit their replies to be only approximative, while a large number explain that "absence by reason of sickness" may mean indisposition to work from many other causes. One manufacturer replies that his employees "seem fresher on Saturday night than on Monday morning." Many assert that absence in their mills has been too trifling to be reckoned.

Ninth Question.

	Those in Company's Tenements.	Those living in their own.	Doubt expressed, &c.	Total Replies.
Cotton,	22	7	62	91
Wool,	11	3	80	94
Silk,	–	1	4	5
Flax,	1	–	5	6
Jute,	–	–	2	2
Total,	34	11	153	198

Of the 152 replies to question 9, about half say there is no perceptible difference; the rest are nearly all from those who either exclusively do or do not own the tenements, and are thus unable to institute a comparison.

Tenth Question.

	In a greater degree.	In a less degree.	Non-committal.	Total.
Cotton,	15	3	69	87
Wool,	16	3	72	91
Silk,	–	–	4	4
Flax,	1	1	4	6
Jute,	–	–	2	2
Total,	32	7	151	190

Those whose answers are not absolute, either misunderstand the question, and answer it "yes" or "no," instead of "greater" or "less;" or "do not employ the foreigners" referred to, or, if employing them, "do not perceive any difference."

Eleventh Question.

	Yes.	No.	Total.
Cotton,	65	27	92
Wool,	58	37	95
Silk,	2	3	5
Flax,	3	5	8
Jute,	–	1	1
Total,	128	73	–

Many of the larger mills report that they make special provision in case of sickness, in the employment of corporation physicians, hospitals, relief societies, nurses, &c. In some instances a special chamber for the sick is required to be kept in reserve in each corporation boarding-house.

Twelfth Question.

	Yes.	No.	Total.
Cotton,	89	5	94
Wool,	91	7	98
Silk,	5	–	5
Flax,	6	–	6
Jute,	1	–	1
Total,	192	12	204

The affirmative answers apply especially to the ventilation and cleanliness of *mills*, many of the replies distinctly stating that "they do not pay special attention" otherwise. In other cases careful attention is given to the sanitary condition of boarding-houses controlled by the manufacturers.

Thirteenth Question.

	Yes.	No.	Total.
Cotton,	33	59	92
Wool,	30	62	92
Silk,	4	1	5
Flax,	1	5	6
Jute,	–	1	1
Total,	68.	128	196

Many of those replying in the negative do not own tenements for their employees.

Fourteenth Question.

	Yes.	No.	Total.
Cotton,	60	33	93
Wool,	37	58	95
Silk,	1	3	4
Flax,	2	5	7
Jute,	–	1	1
Total,	100	100	200

In a considerable proportion of the negative responses, the "town authorities" are said to "see to it."

Fifteenth Question.

UMBER OF HOURS WEEKLY.	Cotton.	Wool.	Silk.	Flax.	Jute.	Total.
. . . . .	–	2	–	–	–	2
. . . . .	–	1	–	–	–	1
. . . . .	–	1	1	–	–	2
. . . . .	–	1	–	–	–	1
. . . . .	13	10	2	2	–	27
. . . . .	2	–	–	–	–	2
. . . . .	2	2	–	–	–	4
. . . . .	1	–	–	–	–	1
. . . . .	2	6	–	1	–	9
. . . . .	4	8	–	1	–	13
. . . . .	4	6	–	2	–	12
. . . . .	–	1	–	–	–	1
. . . . .	62	54	2	2	1	121
. . . . .	2	–	–	–	–	2
. . . . .	2	2	–	–	–	4
. . . . .	–	1	–	–	–	1
. . . . .	–	1	–	–	–	1
. . . . .	1	2	–	–	–	3
. . . . .	–	2	–	–	–	2
Average, ...	64.8	64.7	62.2	63.7	66	–
General average, ...						64.4

ıe comparison of death-rates among minors in factories death-rates among minors in the general population can- ɔe made in strict compliance with the terms of the Resolve, we do not know as yet either the numbers of the people ɛfinite ages, or the deaths among them in 1870. This is a er of little consequence, however, since mortality rates at ıin ages are very nearly the same in every year. The rates h prevailed in 1860 and 1865 (years of census) are used e following table, and we have every reason to believe that ecord of 1870 would be similar. The diminished popula- between the ages of fifteen and twenty in 1865, as compared 1860, was caused by the loss of young men in the four ious years of war.

Table showing Comparative Mortality among Minors, in the State of Massachusetts at large, and those employed in mills.

IN THE STATE AT LARGE.

YEAR.	Number of Minors.			Deaths from Consumption.			Number of Deaths to 1,000 of Population.			Number Living to one Death.		
	10 to 14, inclusive.	15 to 19, inclusive.	Total.	10 to 14, inclusive.	15 to 19, inclusive.	Total.	10 to 14, inclusive.	15 to 19, inclusive.	Total.	10 to 14, inclusive.	15 to 19, inclusive.	Total.
1860, . .	114,345	120,799	235,144	75	392	467	.66	3.24	1.99	1,525	308	504
1865, . .	126,691	117,171	243,862	86	397	483	.68	3.39	1.98	1,473	295	505
AMONG MILL OPERATIVES.												
1870, . .	3,457	9,410	12,867	4	23	27	1.16	2.44	2.09	864	409	477

IN THE STATE AT LARGE.

YEAR.	Deaths from other Causes than Consumption.			Number of Deaths to 1,000 of Population.			Number Living to one Death.			Deaths from All Causes.			Number of Deaths to 1,000 of Population.			Number Living to one Death.		
	10 to 14, inclusive.	15 to 19, inclusive.	Total.	10 to 14, inclusive.	15 to 19, inclusive.	Total.	10 to 14, inclusive.	15 to 19, inclusive.	Total.	10 to 14, inclusive.	15 to 19, inclusive.	Total.	10 to 14, inclusive.	15 to 19, inclusive.	Total.	10 to 14, inclusive.	14 to 19, inclusive.	Total.
1860, . .	398	484	882	3.48	4.01	3.75	287	249	267	473	876	1,349	4.14	7.24	5.73	242	138	174
1865, . .	565	731	1,296	4.46	6.24	5.31	224	160	188	651	1,128	1,779	5.13	9.62	7.29	194	104	137
AMONG MILL OPERATIVES.																		
1870, . .	15	36	51	4.34	3.83	3.96	230	261	252	19	59	78	5.49	6.27	6.06	182	159	165

The preceding table expresses the principal facts which we were directed to procure *in so far as they can be reached by the means at our command.*

Most of the larger mills have made returns. Most of the smaller mills have not. The aggregate of nearly thirteen thousand minors is certainly a very considerable proportion of the whole number employed in factories in the State.

The correspondence in death-rates between the factory population and the whole population at the same ages is remarkably close, so much so as to leave little to be said. A certain allowance is to be made for the deaths of young men in 1865, the last year of the war. But for that, the deaths from all causes between fifteen and nineteen would have been about the same in the general population in 1865 as in 1860. That this is so is apparent by looking at the deaths from consumption in those two years.

The question concerning deaths by consumption was sent to the manufacturers, because of the fact that very nearly forty per cent. of all the deaths between the ages of fifteen and nineteen inclusive are from this disease in Massachusetts every year.

The same proportion is seen to be also returned in 1870 among the mill operatives.

The result of this inquiry shows that the mortality among minors in factories, *in so far as it is expressed by the returns we have received*, is the same as in the general population.

We think, however, that such returns cannot express the whole mortality incident to factory life.

The operatives are migratory. They do not generally stay in one mill a year. (See table based on the replies to question 7.)

It is reasonable to suppose that when unfit for work by reason of sickness, and particularly when gradually weakened in the first stages of consumption, a certain proportion of operatives go to their homes, or among their friends, and are lost sight of. If this is so it must surely raise the rate of mortality among minors in factories above that of minors in the general population.

On the other hand, it is to be remembered that the young operatives in our mills are drawn for the most part from a class

of foreigners who do not live under circumstances favorable to health, and whose death-rate at all ages is certainly much higher than among the population at large.

The influence of occupations on health is of the greatest interest, and its importance is fully recognized by the Board of Health. It is, however, a subject more difficult to study in this country than in any other country in the world, from the tendency of our people to change their occupations. This difficulty meets us in the present investigation.

It is hoped, however, that the facts which we have been able to collect may be found useful to the legislature and to the people of the Commonwealth.

REPORT

THE USE OF MILK FROM COWS AFFECTED WITH "FOOT AND MOUTH DISEASE."

By Arthur H. Nichols, M. D., of Boston.

[Note by the Secretary.]

The preceding papers were presented to the legislature in manuscript on the 21st day of January, 1871. *At that time the effects upon man of the "foot and mouth disease" in cattle were under investigation by the State Board of Health, but no definite results had been reached. Since that period, and while this volume was being printed, certain facts have been ascertained which it seems important to make known at once, as the disease in question still exists in Massachusetts.*

The singular affection of a family in Brighton excited the attention of their physician, Dr. Marion, who reported to us early in January, his belief concerning the cause of the disease.

Dr. Nichols has since conclusively proved the correctness of the diagnosis, and has added much information on the whole subject in the following pages.

The prompt and efficient action of the Cattle Commissioners has been attended with excellent results, but in spite of their efforts it will not be surprising if the disease shall linger among us in some localities for many months to come.

Boston, February 23d, 1871.

THE EFFECTS OF THE USE OF MILK FROM COWS AFFECTED WITH APHTHA EPIZOÖTICA.

Aphtha epizoötica, otherwise known as *vesicular murrain*, or *foot* and *mouth* disease, (*maladie apthongulaire*, *mund-und-klauenseuche*) is an exceedingly contagious disease which prevails among cattle, horses, sheep, deer, goats, pigs, etc., and is characterized by an erysipelatous-like eruption terminating in the formation of vesicles, pustules and ulcers. The attack is generally accompanied by slight feverish symptoms; the animal exhibits an uneasiness in standing, and an unwillingness to move, or if an attempt is made to walk, decided lameness is noticed in one or more limbs. The local symptoms are thus described by George W. Balfour, M. D.*

* Edin. Med. Jour., Feb. 1863, p. 707.

"There is generally a harsh and frequent cough, but this symptom is not invariable; the mucous membrane of the mouth is swollen, and exhibits little reddish elevations; there is a considerable flow of saliva from the mouth, and in about twenty-four hours from the first appearance of the disease, a crop of vesicles is found to be thrown out across the upper part of the mouth, along the sides of the tongue, within the lips, on the muzzle, and in the nostrils.

"Vesicles are also occasionally found around the roots of the horns, and on the external parts of generation, while they are more common in the interdigital spaces and on the udder and teats, and these latter organs are often very much involved in those animals which are far advanced in gestation or in those giving milk. These vesicles are irregular in form, and have neither the central depression nor the distinct inflammatory areola observed in true cow-pox. They are at first about the size of a millet-seed, but gradually increase in size to that of a kidney-bean, or larger. The contents of these vesicles are at first pure lymph, but within a few hours this becomes more or less opaque from the admixture of shreds of lymph and pus corpuscles. Sometimes this fluid is absorbed, and the cuticle desquamates, leaving a raw surface; at other times the vesicles burst and scabs are formed, while in severer cases ulceration occurs which may take eight or ten days to heal. These symptoms all increase till about the third day, after which they commence to decrease, and in mild cases the animal is well in little more than a week."

The mild nature of the disease may be illustrated by an abstract of the report of Mr. Jeffs, by which it appears that the total number of diseased animals in the Bridgewater district, England, from August 20th to October 1st, 1869, amounted to 1,858 cows, 544 heifers, 431 oxen, 38 bulls and 43 pigs, none of which died.

It seems established then by these and similar observations, that a fatal termination is extremely uncommon, and even where death has taken place, it has apparently resulted not so much from the virulence of the specific poison, as from simple inanition, the ulcerated condition of the mouth and tongue preventing the animal from taking food sufficient for nourishment

The small number of prominent symptoms, and the fact that there have appeared as yet no spurious forms of the malady,

render the affection easy to distinguish, and one case presents therefore in every essential particular a model of all others.

The above described distemper which in some unknown manner was introduced into England for the first time in 1839,* and which has recently visited this State, presents several features of more than ordinary interest. The manner of its original introduction into the town of Brighton, where it was first noticed; its radiation from this place as a central point, thus penetrating distant counties and States; the mode of its extension, at times moving regularly along through contiguous farms, at others travelling over considerable districts and appearing in remote localities; the development and propagation of the disease as affected by conditions of temperature and other atmospheric influences,—all these present practical and interesting questions for scientific investigation, the solution of which there is reason to believe, would demonstrate most forcibly the utility of "sanitary cordons" and other restrictive measures for preventing the spread of the malady, which have been recently put in operation by the State Cattle Commissioners.

The absence of accurate data renders it impossible to settle conclusively many of these points, and it is proposed therefore in this article to answer merely one question which meets us at the very threshold of all inquiry, viz: in what manner can the disease be communicated to human beings?

It has long been known to medical men, that children who had been fed with the milk of affected cows, were not unfrequently attacked with vomiting and diarrhœa, but it was maintained that these symptoms might be explained without assuming that the specific poison of the disease had been communicated, since it has been remarked that at the height of the disease, the milk very soon turns sour; it also coagulates upon being boiled, or having its temperature very slightly raised, and moreover has been found at this time to contain pus corpuscles,† and it was thought therefore, that these facts

* Veterinarian, Vol. XIV., p. 184.

† It has not yet been satisfactorily ascertained whether these corpuscles are secreted with the milk, or (as would seem more probable) they derive their origin from the pustules on the udder, and are transferred to the pail by the process of milking. A microscopical examination was made of the milk from one cow seen at Brighton, which was recovering from a severe attack. In this instance neither pus nor parasitic growths were detected, but the milk was found to be sour four hours after it was secreted.

alone were sufficient to account for the above intestinal disorders. The recent outbreak in this State has afforded strong additional evidence that the use of such milk may be followed not only by lesions of the mouth and intestines, but also by a well-marked cutaneous eruption, as shown by cases which occurred in the practice of Dr. H. E. Marion, of Brighton, by whom the method of the introduction of the contagion was distinctly traced.

It seems that shortly after the malady appeared in the cattle-yards at Brighton, it attacked fourteen cows, constituting a dairy which is situated over a mile from the yards. Attention was first attracted to one of the cows from the fact that she refused to eat, and upon examination the entire inner surface of the mouth was found to be covered with a slimy secretion, and numerous ulcers were seen on the lips and tongue. Although this animal was immediately removed from the barn, the others were soon after seized in like manner. It is certain that after the appearance of the disease in the first cow, the milk was for a while consumed as usual, the symptoms not having become sufficiently developed to enable their true nature to be recognized by the milkers,* so that there can be no doubt that the milk of one diseased cow, together with that of thirteen others, at that time unaffected, was distributed to various families, during a period not exceeding two or three days.

In one family, the members of which partook freely of milk from this source, a peculiar disease broke out in the course of five or six days, causing at the same time similar and well-marked symptoms in no less than three individuals, all adults. These symptoms consisted of loss of appetite, nausea, slight acceleration of the pulse, swelling of tonsils and sub-maxillary glands, the appearance of a few vesicles upon the lips and tongue, and a singular cutaneous eruption on the lower extremities, consisting of clusters of papules, vesicles, pustules and ulcers of different sizes,—the latter characterized by a dark-red color, while their peripheral margin was slightly elevated and inflamed. These appearances, in varied stages of development,

* In justice to the proprietor of this dairy (whose pecuniary loss has been heavy), it should be stated, that as soon as the true character of the disease became known, he at once notified all families supplied by him, and ordered all the milk subsequently obtained from diseased animals to be thrown away.

were all seen at one and the same time, indicating that a fresh outbreak of vesicles was taking place as rapidly as the old ones disappeared. In each instance the eruption was confined to one limb, in two instances appearing upon the front and side of the thigh, and in the other just below the knee, and although attended by no great constitutional disturbance, was, nevertheless, rather tedious in its progress, lasting six or seven weeks.

Inquiries were instituted with the idea of ascertaining whether other cases, traceable to this infected farm, existed in the town, and it transpired that another less pronounced instance of the disease occurred at exactly the same time, in a woman who had been supplied with milk from this dairy. Dr. Braman, of Brighton, by whom the case was observed, furnishes the details, as follows:—

"The symptoms here noticed were an efflorescence upon both lips, which at a distance looked swollen and everted, and on closer examination were found to be studded with minute vesicles and apthous patches; decided swelling of the mucous membrane of the gums and nasal cavity, pain and tenderness in the region of the abdomen, and diarrhœa."

In order to demonstrate more conclusively the specific nature of the cutaneous eruption, quills were charged with the contents of these vesicles in the human subject, and the poisonous element was in this way transferred to the bodies of two young rabbits. At the expiration of two days, the inner surface of the upper lips was found to be swollen and covered with a bloody discharge; later, several small white specks were formed upon the inflamed spots, and the animals were seized with convulsions and died, one in three, the other in four days from the time of inoculation.

Portions of the same lymph were next introduced by the ordinary method of scarification into the arm of a healthy man. In two days vesicles began to form at two of the three points of inoculation, similar to those upon the thigh of the woman from whom the lymph was obtained. In four or five days more, these vesicles, having attained the size of a large split pea, were

ruptured, and in their places appeared unhealthy-looking ulcers, which instead of healing, continued to increase in size.*

The fact that the milk of diseased cows may produce an eruption on the surface of the body of human beings, analogous to that developed in animals, has been satisfactorily shown by Professor Hertwig,† of Berlin, in a series of experiments performed upon himself. He began by drinking daily a quart of fresh milk taken from a diseased cow, and upon the second day experienced a slight fever, contractions of the limbs, headache, heat and dryness of the mouth, and an itching sensation in hands and fingers. Five days later, the mucous membrane of the mouth and tongue became perceptibly swollen, and small vesicles appeared. These vesicles increased in size for a few days, and at last burst, leaving in their place dark apthous patches, which did not disappear for a considerable length of time. Upon the *hands* and *fingers* moreover, vesicles appeared which afterwards burst and dried up in the same manner. Similar experiments were performed by Jacob,‡ at Basle, in which case vesicles were formed upon the chest.

Two cases reported by Dr. J. B. Hislop§ are in this connection, interesting on account of the anomalous character of the eruption :—

"In August, 1862 Mrs. X., the wife of an extensive farmer came under my care, on account of an eruption of bright red spots one-eighth of an inch in diameter, covered with a thin white desquamation, which were so thickly sprinkled over her feet, legs, thighs, and the lower part of her body as to leave only minute interspaces of sound skin. * * * * * *

"On a subsequent visit to my patient I found her husband complaining of sore mouth and throat. Upon examination I found the mucous membrane of his lips, mouth, tongue and throat studded with small ulcers giving off a white slough, which left behind it a clean but highly-sensitive cup-shaped cavity; his forehead was also

* At the present date, (Feb. 22,) twelve days after inoculation, these ulcers have given no indication of healthy action, so that their unequivocal character leaves no doubt as to the contagiousness of the affection, thus distinguishing it from other forms of cutaneous eruption, which though somewhat similar in appearance are nevertheless non-contagious.
A. H. N.

† Medicinische Vereinszeitung, 1834, No. 48, p. 226.

‡ Journal de Médicine Vétérinaire, pub. à l'Ecole de Lyon, Tome II., 1846.

§ Edin. Med. Review, Feb. 1863, p. 704.

covered with an eruption similar to that upon the lower extremities of his wife. As this peculiar combination of symptoms in parties so closely connected was to say the least of it remarkable, I made strict inquiries, and distinctly ascertained that the only cause that could be assigned for this peculiar affection was the circumstance that the whole of Mr. X.'s cows were at that time laboring under the vesicular murrain (*Aphtha Epizoötica*). * * * *

"I subsequently ascertained upon inquiry the various other individuals employed about the cattle had suffered from similar symptoms, though in a less degree. * * * *

"Several of the children about the house were also affected with sore throats, but the symptoms in their case were mild. * * * The family were in the habit of freely using the milk fresh from the cows."

The disease is also capable of being communicated by direct contagion, by means of the viscous secretion from the mouths of animals, as well as by the contents of the vesicles.

Hildebrandt* relates instances where contact with these secretions has produced apthous eruption in the mouth, conjunctivitis, and a pemphigus-like eruption on various portions of the skin. Brosche† reports the case of two girls who had milked cows with diseased udders, upon whose fingers and toes there appeared swollen spots, upon which spots were afterward formed vesicles, analogous to those on the udders of the cows which they had milked.

The above views may be thus stated in a condensed form.

1. It is proved that *Aphtha Epizoötica* may be communicated to man through the medium of diseased milk, as well as by direct contagion.

2. The disease produced in human beings by the use of this milk is not usually to be dreaded, for it is by no means formidable; it is generally limited to a sore mouth, and in very rare instances is accompanied by an eruption on the surface of the body. The use of such milk by feeble persons and young children might however be followed by more serious consequences.

In no well ascertained case has it been found that any ill effects have been produced by eating the flesh of diseased animals, although there is abundant evidence that at the outbreak

* Magazine für Thierh. 1840. VI. 2.

† Die Maul und Klauenseuche der Rinder, etc. Dresden, 1820.

of the distemper in Massachusetts, and before public attention had been directed to its true character, a considerable number of animals, in which the usual premonitory symptoms had appeared, were slaughtered and their flesh sold.

In accordance with the general law that animal poisons are destroyed when subjected to a very high temperature, we are justified in believing that the affection can never be communicated to man through the medium of the meat, provided it be thoroughly cooked, and upon the same principle the milk might be rendered innocuous by being boiled.

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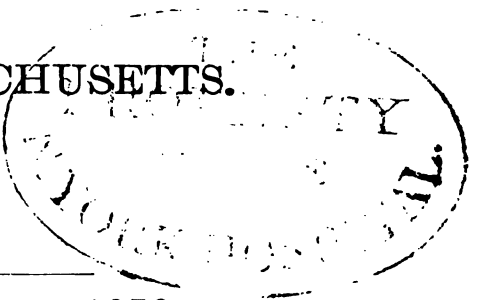
THIRD ANNUAL REPORT

OF THE

STATE BOARD OF HEALTH

OF

MASSACHUSETTS.



JANUARY, 1872.

BOSTON:
WRIGHT & POTTER, STATE PRINTERS, No. 79 MILK STREET
(CORNER OF FEDERAL STREET.)
1872.

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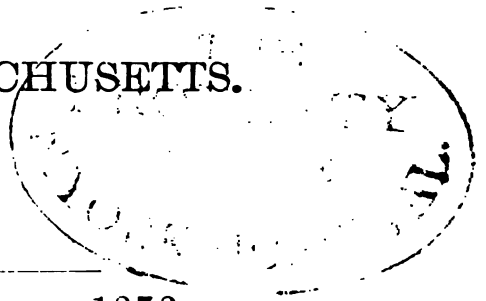
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MEMBERS OF THE BOARD.

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G. V. FOX, OF LOWELL.

WARREN SAWYER, OF BOSTON.

GEORGE DERBY, OF BOSTON, *Secretary.*

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Commonwealth of Massachusetts.

BOSTON, January 22, 1872.

)RACE H. COOLIDGE, *President of the Senate of Massachusetts.*

—I have the honor to present to the Legislature, the Annual Report of the Massachusetts State Board of

Very respectfully,
Your obedient servant,

GEORGE DERBY,
Secretary of the State Board of Health.

GENERAL REPORT OF THE BOARD.

To the Honorable the Senate and the House of Representatives of Massachusetts.

We herewith present to the legislature the third annual report of the State Board of Health. We find reason to be glad that so much has already been accomplished through the direct and indirect influence which the Board has been able to exert.

We trust that the papers now submitted will commend themselves to the legislature; and we are specially desirous that the use which has been made of the executive power placed in our hands by the Act of April 8, 1871, may be approved; and that thus the same moral and material aid which has been given us in the past may be continued in the future.

Doings under the Law concerning Slaughter-houses, and Noxious and Offensive Trades.

A detailed account is herewith submitted of the various hearings and decisions of the Board under this statute. It will be seen that we have been called to consider some of the worst nuisances in the Commonwealth. The meetings summoned to hear these cases have been at times very laborious and irksome to the members of the Board.

It is to be hoped that less of this duty will hereafter be required, and this seems probable inasmuch as the nuisances at Brighton will ere long disappear.

The following is a list of the cases brought before the Board under the law of April 8, 1871, with the decision in each case:

1. William H. Dow of Boston. Bone-boiling. (Ordered to "cease and desist.")
2. Smith Adams of Lowell. Slaughtering and bone-boiling. (Ordered to discontinue certain processes.)

3. George A. Sawyer of Watertown. Slaughtering. (Ordered to discontinue certain processes.)
4. Terence McGovern of Lawrence. Bone-boiling. (Ordered to discontinue certain processes.)
5. E. & C. Rice of Brighton. Depot for blood, collected from slaughter-houses. (Ordered to discontinue).
6. Augustus Wietz of Brighton. Slaughtering. (Ordered to "cease and desist.")
7. Christopher Frischner of Brighton. Slaughtering. (Ordered to "cease and desist.")
8. J. S. Mead of Milford. Bone-boiling. (Ordered to "cease and desist.")
9. J. W. & G. W. Hollis of Brighton. Slaughtering. (Ordered to "cease and desist.")
10. North, Meriam & Co. of East Cambridge.
11. J. P. Squires & Co. of East Cambridge.
12. Joseph Boynton of East Cambridge.

(Complaints against the above hog-slaughtering establishments were made by the health authorities of Cambridge and Somerville. At the time appointed for a "hearing" they were withdrawn by the complainants.)

13. L. F. Merrill of Somerville. Fat-rendering. (Ordered to "cease and desist.")
14. Aaron Gundenhuyzer of Brighton. Slaughtering. (Ordered to "cease and desist.")
15. Nahum Ward & Co., of Boston. Bone-boiling. (Ordered to "cease and desist.")
16. Charles Sanderson of Brighton. Slaughtering. (Ordered to "cease and desist.")
17. John Dupee of Brighton. Slaughtering. (Ordered to "cease and desist.")
18. Jeremiah Pratt of Brighton. Slaughtering. (This case was heard on the 21st October, but no decision was made.)
19. Augustus Wietz of Brighton. Slaughtering. This refers to a new place occupied by the defendant after another place had been ordered to be closed by the Board. (Ordered to "cease and desist.")
20. Sebastian Wietz of Brighton. Slaughtering. At the time appointed for a "hearing" the complainants failed to appear.
21. Upton & Ames of Brighton. Bone-boiling. (Ordered to "cease and desist.")

23. City of Charlestown. Storage of Swill at Almshouse. (Ordered to be discontinued during the months of June, July, August and September.)

A hearing on a second complaint against N. Ward & Co. has been postponed at the request of the counsel for complainants.

This disposes of every case brought before the Board, except one, which was expressed so indefinitely that the Board declined to receive it and notified the complainants of their objection to its form.

Many of the orders above referred to have been complied with. It is, however, known to the Board that in some instances they have been disregarded. In view of this fact, and in consequence of certain applications made to the Board for the enforcement of their orders through appeal to the supreme court as provided in the statute, at a meeting of the Board, October 21st, 1871, the following vote was passed:—

"Whereas certain parties against whom complaints have been made for carrying on noxious and offensive trades, have, upon due notice and hearing before this Board been ordered to desist and cease from further carrying on said trades; but, as the Board are informed, said parties have disregarded said orders. And the attorney-general upon request made to him by the Secretary of the Board having said that he could not in consequence of pressing official duties aid in the enforcement of said orders by applying to the supreme judicial court, and the Board having as they believe no authority to employ counsel to appear before said court for the purpose of procuring injunctions as contemplated by the statute of 1871, chapter 167; therefore,

Voted, That the Secretary be directed to notify the complainants in the cases referred to, or their attorneys, so that they may make the necessary application to the supreme judicial court for the abatement of the nuisances of which they complain; and that the Secretary be directed to furnish such complainants or their attorneys with every facility in his power to enable them to make such application effectual."

In one case only (that of E. & C. Rice of Brighton) has application for the enforcement of our order reached the supreme court, and it was at once granted. Other cases in which

our orders were disregarded are in the hands of the complainant's counsel, to whom in accordance with the vote of the Board above referred to, certified copies of our action have been delivered.

The Brighton Butchers, and the Proposed Abattoir.

In our last report we were compelled to say that the project of building an abattoir was prevented by the steady opposition of the prominent butchers. We are happy now to state that this opposition has ceased; that land has been bought, and that plans are now being made for the erection of buildings in which all portions of the slaughtered animals can be converted into useful materials on the spot. Ample structures for these most important purposes will soon be erected along the borders of Charles River. The probable result will be that Brighton, one of the most beautiful of the towns adjacent to Boston, instead of being a nuisance to itself and to all travellers through its borders, will be rid of all those things which now make it offensive. It will be observed that by the Act of incorporation of the Butchers' Slaughtering and Melting Association, this Board is ordered to see not only that the buildings are properly arranged, but is also required to prescribe rules for the future guidance of all who carry on their trade within the enclosure. Under this law, proper inspection will prevent the entrance of any dead or diseased animal, or the exit of any flesh unfit for food. It is obvious that these regulations, together with the fact that this Board has a right to direct all engaged in slaughtering within six miles of the State House to transact their business at the abattoir if it is found to be a nuisance elsewhere, will be a tower of defence for Boston and its vicinity against the sale of unwholesome meats. The meat of the Brighton abattoir will be preferred by all prudent consumers.

Slaughtering, Bone-Boiling, and Fat-Melting.

(By the Secretary.)

The Board desires to call attention to a special report by the Secretary, in which may be found a detailed and connected history of the operation of the law of April 8th with reference to such general reform in the manner of conducting these trades as will make them no longer "noxious and offensive."

The Board ever since its first establishment has had this question fully before it as one of great importance.

The Evil Effects of Arsenic in Certain Green Colors.

(By Dr. FRANK W. DRAPER.)

This paper is of great interest, and will be found to have many useful applications. It should be read by ladies who choose green as a color for the walls of their drawing-rooms, or for their dresses, or who wish to wear bright green flower leaves as ornaments. Guardians of children should beware of green-painted toys. The green-paper covers of Boston confectionery are sometimes deadly. Green lamp-shades are to be suspected. All that is needed to protect the community from these dangers is such knowledge of the subject as is given in this report.

Mill-Dams and Water Obstructions.

(By the SECRETARY.)

The hygienic effect of the building of dams is usually wholly ignored by capitalists and legislators. We here see the danger to life of proceeding thus blindly. Here are facts sufficient to convince any unprejudiced mind that consumption and malarious fevers are thus aroused. Epidemics flourish near such water obstructions. Great nuisances are thus created in various places cited in this report. It will be seen that the industrial and hygienic questions are inseparably joined, and it will be well that our legislature should so regard them when mill-dams are thought necessary to aid capital in its honorable endeavor to turn our various water-courses to the benefit of man.

Alcoholic Drinks—Their Use and Abuse—Analysis of the Information Derived from Correspondence throughout the Globe.

(By the CHAIRMAN.)

The Board submits to the legislature this paper prepared with care and labor by the Chairman of the Board.

It is a more thorough analysis of the correspondence published last year than could be made at that time. The Board presents it as a valuable contribution to the discussion of the general subject of the use and effect of intoxicating drinks, but

without expressing, as a Board, any opinion concerning the inferences made by the writer, or on the special methods advocated by him.

The idea of bringing intemperance under cosmic law, and of graphically representing that fact, the Board believe is brought out in this paper for the first time in the history of the subject.

The Board heartily commend the proposition for the establishment of inebriate asylums for the restoration to health of dipsomaniacs.

Adulteration of Food.

(By Mr. Henry B. Hill.)

It is the hope of the Board to be able to investigate the quality of food in its various forms as offered for sale in Massachusetts. The inquiry by Mr. Hill concerning canned-fruits, vinegar and coffee, is a contribution to this general design.

As regards fruits, it would appear from the specimens examined that although traces of metal were found in the cans, their amount was exceedingly small. It is to be remembered, however, that the solder contains a large proportion of lead, which may be readily dissolved in case the fruit undergoes acid fermentation—a thing not unlikely to happen.

It is also evident that care should be used in sealing the cans that the solder does not drop within.

Vinegar is found to be sometimes fortified with sulphuric acid, which no one would like to have mingled with his food. It also appears that lead faucets are not infrequently used in vinegar barrels—a practice full of danger, as will appear by reference to our report of last year on poisoning by lead.

Coffee bought in bulk was found to be really what it purported to be, while so called coffee put up in pound parcels was largely made up of pease and beans, and in one specimen contained no coffee at all. These facts the Board believe are worthy of consideration by every householder.

Proper Provision for the Insane.

(By Dr. Edward Jarvis.)

Dr. Jarvis has contributed a valuable paper with reference to the classification of insane people. He urges the necessity of variation in the character of the architecture of asylums to meet the various classes of patients, and of erecting buildings

in future more in accordance with modern opinions in this regard. No restraint, except what is absolutely needful, should be put upon the unfortunate inmates of these establishments. At present our asylums have too much of the general aspect of common jails. The Board commends this report to the consideration of those who may be charged with the building of hospitals for the insane.

The Use and Abuse of Opium.

(By Dr. F. E. Oliver.)

There has been an enormous increase in the importations of opium during the past quarter of a century, and it behooves us to discover, if we can, what use is made of it. It will be seen that the habit of opium-eating has not infrequently had its origin in the prescriptions of physicians, who have given it for the relief of pain. Also, that various nostrums much used among children contain large amounts of this drug. Reform from the opium-eating habit is found to be even more difficult than from the intemperate use of alcohol. The reports respecting both opium and alcohol in the present volume will be found to present facts of great importance. In view of the similarity of the conclusions reached by the authors of these papers, it is proper to say that each was entirely ignorant of the other's investigations.

Effects on Health of the Use of Sewing Machines Moved by Foot-Power.

(By Dr. Arthur H. Nichols.)

This is a very complete statement of the subject, and is based on personal investigation, and on returns from a large number of correspondents.

It proves that various ailments are caused by sewing machines moved by the feet. It is evident that most women cannot make continuous use of the common pedal for any considerable time without suffering from general feebleness, and also locally about the pelvis. These evils may be prevented by

1st. The substitution of steam for foot-power in large establishments.

2d. By the use of electro-magnetic power; or,

3d. By the use of improved pedals, which greatly reduce the required movements of the feet and legs of the operator.

The information contained in this report deserves careful consideration by every one interested either by personal use of the machine, or by superintendence of the labor of others.

Vegetable Parasites and the Diseases caused by their Growth on Man.

(By Dr. James C. White.)

This paper is a thoroughly scientific and elaborate statement of the whole subject of vegetable parasites which appear on the exterior of man. As such it is submitted by the Board to the medical profession, in confidence that they will find it of great value.

But the remarks the author makes on chignons may interest women; while those on barbers-itch will suggest important cautions to every man who shaves save at his own home. Any one who allows his beard to be cut at a barber's is liable to have a disgusting and troublesome affection, lasting for months.

Small-pox in Massachusetts.

(By the Secretary, and our Correspondents.)

This paper should be read by every one, especially by local Boards of Health. It shows that unintermitting vigilance against the first inroads of the disease, and prompt measures for the seclusion of patients ill with it, together with a thorough vaccination of all children, and of all non-vaccinated or imperfectly vaccinated adults, are the only safeguards for a community. If in all the places in this Commonwealth the above rules had been always adhered to, the greater part of three thousand dead from small-pox in Massachusetts in twenty-eight years would have been saved.

The epidemic in Holyoke in 1870 might have been prevented. That in Lowell in 1871 was probably started by one case which was concealed from the authorities. No complete seclusion of the sick could be made until it was too late.

The prevalence of small-pox during the past year in this country as well as in Europe, induced the Board to issue a circular concerning it to the various towns of Massachusetts.

We would call the attention of the legislature to the defects

of the present law relative to small-pox, and we think that the 51st section of the 26th chapter General Statutes of Massachusetts should be repealed. If that were done, small-pox would be more completely under the control of local Boards of Health, and they could act efficiently in any case to secure isolation of the disease.

Health of Towns.

In this division of our Report will be found letters of interest from our correspondents in the various towns. Among them will be found information concerning lead-poisoning and typhoid fever, which came too late for our reports on these special subjects in 1871. Suggestions like those concerning the ventilation of workshops, may lead to a special investigation of this most important matter.

The causes of disease are obscure, and the elements which combine to produce it are complex and diverse. We welcome all observations on this subject coming from men whose lives are devoted to its study, but we do not by the publication of their opinions express the belief of the Board in their correctness.

Health of Boston.

We have seen with great pleasure two propositions made during the past year in the Boston City Councils. One relating to the appointment of inspectors of meats, fish and vegetables, with power to seize and destroy all such articles which are offered for sale in a condition unfit for food. And another proposing that the powers of a Board of Health be transferred from the Board of Aldermen to a distinct and independent board holding office for a term of years, and selected with reference to their fitness to meet the important questions which must constantly engage their attention.

We believe that such reforms would prove of inestimable benefit to the metropolis, and the same general plan would be equally useful in other cities of the Commonwealth.

Model Lodging and Low Tenement Houses.

Among the papers given in last year's report, was one on the above subject. A low tenement house of a most infamous character in Boston, the "Crystal Palace," was described (page

221 and page 212,) and there was a brief account of the labors of Miss Hill aided by Mr. Ruskin of London, in their "Organized work among the Poor." It is very gratifying to learn that these statements produced important immediate results. Near the close of the session of the last legislature, the Boston Coöperative Building Company was incorporated. It had for its object the building and hiring of tenements for the poor, with the idea of improving the abodes, and thereby benefiting the people, sanitarily and morally.

With sufficient capital it has purchased a large lot of land in East Canton Street in Boston, and it is erecting a block of buildings thereupon. But the most interesting and important act the corporation has performed was the hiring, in September last, of the Crystal Palace. It was described, in our last year's report, as the abode of filth, robbery, drunkenness and prostitution. The company hired it with the intention of improving the building, and, as we have stated, with the hope of improving also the tenants. At the same time it expected to obtain a fair return for money invested.

It is too short a time for any real reformation to have taken place in adults. But, under the rule of the company, the following most interesting results have been obtained: The building outside, instead of being a disgrace to the street by its filthy look, has a neat appearance. It has changed its name, and now, instead of the name of contempt, "Crystal Palace," it is styled the Lincoln Building.

Before the corporation entered, riot, disorder, and arrests for drunkenness and family broils, were of constant occurrence. The place was the objective towards which apparently all the scoundrels of the neighborhood congregated. During the first two months the agent was not unfrequently obliged to grapple with and forcibly eject wretches who came apparently for the purpose of doing violence to helpless women and children, and from which, under the previous regime, they had no escape. Daily did intoxicated persons seek the corridors of the building to sleep off the consequences of debauch. All is now changed. The trade of the police is virtually gone. The chief of the district reports that during November and December he heard of no complaint there. The grog-shop that had existed from the time of the erection of the building, was

swiftly swept away. A "Holly-Tree Coffee House" will take its place. The basements, those human slaughter-houses, were shut up immediately after the company took possession. Very large shafts have been cut through the roof of the building, through all the floors, with ventilators above them, and rooms that have never had light and air now have a sufficiency of both. During the three past months the amount of illness, as reported by the dispensary physician, has been only one-third of what it was in a corresponding period before these improvements were made.

A sewing school has been established. On Christmas Eve a Christmas-tree arose in the building, and neat children gathered happily around it,—a fact that has never occurred before. On January 7th, 1872, as a harbinger of thrift and economy as it is hoped during the ensuing year, $18.10 were deposited in a Five Cents Saving Bank in Boston by thirty-two children.

Truly if the Board had done nothing more than to have been indirectly a stimulus to prove by this example what can be done towards elevating the people, both physically and morally, it would not have served the State in vain.

The Board heartily commends the work of the company as one well worthy of imitation in Boston and in every city of the Union. It is supposed to be the intention of the company to extend its operations still further, and to hire other buildings of the same character after all the intended reforms at the Lincoln Building shall have been fully carried out, and shall be in easy working order.

Records of Sickness.

The practicability of recording the diseases prevalent in any community is at present the subject of interesting discussion in Europe. It has been but little mooted in the United States.

No feasible general plan for obtaining this valuable information has as yet been devised. There is doubt in many minds as to the value of such records, since they must, from the nature of the case, be imperfect. Many physicians keep no notes of the cases under their charge. The records of others should not be made known. But nothing is or can be perfect in this world, and the argument holds against all investigations, since no man can ever hope to arrive at absolute truth. We believe that the

object is a most desirable one. We desire to know our constant working force, and how many days are lost by disease. We cannot apply our remedies to the best advantage without a knowledge of the prevailing forms of sickness.

If it were possible to obtain from all hospitals, dispensaries and infirmaries, monthly reports to this Board of all cases of disease coming under their care, it would lead to valuable general results. From such returns the prevalence and progress of epidemics might be made much more apparent than they now are, and their relation to some great cosmic or telluric laws perhaps discovered. If such a plan were commenced in Massachusetts, and gradually extended through State Boards of Health to each of the United States, the grand idea of a National Department of Health, proposed many years ago by Jeremy Bentham, might be realized.

Watching closely the signs over such an extended horizon, a central observer might be able to give signals of approaching danger similar to those concerning the weather now furnished by the Signal Service of the War Department.

Expenses of the Board.

It will be seen in a statement under this head that the expenses in 1871 amounted to $2,843.05. The requirements of the Board are very difficult to foresee. It is hoped that the same liberality and confidence may be extended to us in the future, and that we may be permitted, as in the past two years, to expend a larger sum if it should be needful.

Weekly Report of Deaths.

A weekly report of deaths, commenced in November 1869, has been made every Wednesday during the year in the "Boston Morning Journal." It has included the largest cities and towns, with few exceptions. We desire to express our thanks to the registrars and clerks who have furnished this information.

Subjects of Present and Future Investigation.

In addition to the subjects on which special reports are now submitted, others have received attention, and their investiga-

tion will be continued. Among them may be mentioned "Consumption; its causes and the means for its prevention," and "The food of the people of Massachusetts."

All of which is respectfully submitted.

HENRY I. BOWDITCH,
RICHARD FROTHINGHAM,
R. T. DAVIS,
GEORGE DERBY,
P. EMORY ALDRICH,
G. V. FOX,
WARREN SAWYER,

Members of the State Board of Health of Massachusetts.

EXPENSES OF STATE BOARD OF HEALTH 1871.

and stationery,	$529 25
ng expenses of Secretary,	130 51
charges,	95 06
les' fees,	53 26
ire,	182 25
es,	152 00
et's services,	51 00
l expenses of members while engaged in the duties of the	
ard,	178 58
;	186 51
ph,	6 04
messengers,	51 45
al examination of arsenic wall-papers,	40 00
of tannery waste,	30 00
of canned-fruits,	55 00
investigations concerning sewing machines,	256 25
adulteration of food,	150 00
parasitic diseases,	200 00
opium,	100 00
arsenic,	150 00
foot-and-mouth disease,	60 00
the insane,	100 00
consumption,	129 37
neous expenses,	6 52
	$2,843 05



ARSENIC IN CERTAIN GREEN COLORS.

By Frank W. Draper, M. D.

ON THE EVIL EFFECTS OF THE USE OF ARSENIC IN CERTAIN GREEN COLORS.

Everybody knows that arsenic is a deadly poison. Its name at once suggests to the popular mind a virulence of action possessed by only a few of the kindred agencies which are placed at the disposal of mankind. Although recognized by the physician as a valuable remedy under certain conditions, its administration is advisedly attended with special caution, its minimum dose being fixed at a very small fraction of a single grain. Murderously-disposed men have found it a quick and subtle means for the accomplishment of their malicious purposes; and discontented mortals, tired of life, have taken it as an efficient instrument for self-destruction. In acknowledgment of its deadly power, wise legislative enactments have prudently regulated and restricted its sale by druggists and others, with a view to protect mankind, as far as may be, from the evil effects of its indiscriminate distribution.

In contrast with this general knowledge of the poisonous properties of arsenic, and with the carefully devised measures which are enforced in order that the least possible harm may result from the employment of such an agent, is its unrestricted use in certain arts and in the manufacture of certain articles which, by most persons, are deemed harmless. The application of arsenic as an ingredient in certain pigments is very extended. It finds its way thus into our dwellings, is spread on the walls of sleeping-rooms, is worn in articles of dress, and assumes a great number of forms in which its presence is unsuspected or, if recognized, is not deemed deleterious. It is the object of this paper to point out some of these forms in which arsenic is introduced to daily use, and to inquire if this liberal exposure is productive of harmful results.

The investigation is not an original one. At various inter-
ls during the whole of the present century, attention has been
lled to the subject by scientific observers; strong warnings
ve been given of the danger which was believed to be entailed,
d earnest appeals made for some effective legal measures of
triction or of prohibition. So long ago as 1740, the employ-
nt of arsenic, as a pigment in certain manufactures, was
bidden in France, and attempts have been made from time to
ne since then to regulate trade in this respect. These warn-
gs and enactments have however proved but partially effectual;
d it is believed that, at the present day, the subject is one
ich warrants solicitude in behalf of the public health, and
tifies renewed investigation by its continued magnitude.

Arsenic, aside from its utility as a remedial agent, is chiefly
ployed to form an ingredient of certain green coloring
tters. It enters into two of these pigments, — the arsenite of
pper, which is Scheele's green, and the aceto-arsenite of cop-
r, called also Schweinfürt green from the town where it is
gely manufactured. To both of these, names are moreover
ven interchangeably, and they are generally known among
rkmen as emerald green or "emerald," mineral green, some-
nes (although erroneously) as Brunswick green or Vienna
een. In France, they are called *vert Anglais* or English
een. Of these colors, the former (Scheele's green) contains
ore than one-half its weight (55 per cent.) of pure arsenious
d or white arsenic; while the Schweinfürt green is still more
undantly supplied, having in a hundred grains, 58 grains of
e poison.

Either of these combinations of arsenious acid and sulphate
copper forms a very beautiful and durable green color whose
lliancy will bear any light well. Its tint is a lighter and
rer green than any other of artificial manufacture, and hence
especially alluring to the eye. The materials of which the
gments are made are comparatively inexpensive, and the
nufacture involves very little intricacy or delicacy in its vari-
s processes. For these reasons, these arsenical greens have
vays maintained their popular favor, both with manufac-
rers and the public in general. Their use has been and still
ntinues to be extensive and lucrative, giving employment to
ge numbers of workmen. So important has their application

been considered in the making of wall-paper and of artificial flowers in Paris that when, at one time, it was agitated whether it were practicable to prohibit the use of arsenic in these arts, certain of the manufacturers protested that such an edict would necessitate the absolute suspension of their works. In 1860, a manufacturer of paper hangings in England stated that he used two tons of arsenic weekly;* and the amount of the color annually manufactured in that country was estimated in 1862, at from five hundred to seven hundred tons.†

It should not be inferred from these statements that all green pigments in ordinary use are arsenical. Not a small proportion of the green colors employed for painting, dyeing or color-printing, are of other and comparatively harmless composition. It is not always easy to distinguish them by their physical appearances, but chemistry affords a ready test which may be easily applied. The suspected green material is to be placed in a solution of ammonia (*aqua ammoniæ*). If arsenite of copper be the coloring agent, the liquid will acquire a blue tint, from the disengagement of the oxide of copper from its combination with the arsenic. If a farther test be desired, a few drops of the colored ammoniacal solution poured upon crystals of nitrate of silver will leave on the crystals a deposit of yellow arsenite of silver.

These arsenical green pigments are both deadly poisons, differing in the intensity of their effects only in slight degree from the pure arsenic of which they are in part composed. Taken into the stomach, they give rise to the same train of symptoms and demand the same prompt antidotes. The combination of the arsenious acid with copper serves only to dilute the poisonous properties of the former and offers no farther protection against its action. Suicides have availed themselves of the pigment as a means of self-destruction. In 1849, a girl, aged 12 years, a maker of artificial flowers, became possessed with a distaste of life remarkable at her age. She swallowed a quantity of the arsenical green powder used in her work; symptoms of acute arsenical poisoning promptly supervened and, in spite of remedies, vigorously applied, the girl died in a few hours.

* Taylor on Poisons, p. 430.

† Fifth Rep. of Med. Officer of Privy Council, 1863, p. 129.

Such are the properties of the green coloring matters containing arsenic. It remains to study some of the forms under which they are presented to the public, with the dangers pertaining to their indiscriminate employment.

I. *Artificial Flowers and other Articles of Dress.*—The manufacture of artificial flowers constitutes an important and extensive industry both in this country and abroad; and into some of its various branches the employment of the arsenical greens has largely entered. Many of the green sprays of artificial grass and leaves which so closely imitate the verdure of nature and bring out in artistic contrast the floral colors with which they are combined, owe their delicate shade and brilliancy to the presence of emerald green.

The process of manufacture is a simple one. Generally, the texture from which the leaves are to be cut is colored in the piece. The coloring material is made by thoroughly stirring together a mixture containing, in definite proportions, the green pigment, cold water, and starch, gum-arabic or some similar substance which shall give the color consistence and adhesiveness. Not unfrequently, in this process, the hand and forearm are freely used in the liquid, to expedite the work. Of this mixture, properly prepared, the workman takes a quantity in his fingers, and roughly spreads it over the muslin or fine calico. The fabric is then beaten and kneaded between the hands until it is uniformly colored; the longer this process is continued, the more perfect is the result. The cloth is now fastened to a frame for drying. In all this process of coloring, the hands, forearms and frequently also the face of the operative must become soiled with the green color. It will be also observed that the color is but loosely applied, no mordant being used, as in calico-printing, to fix the pigment in the texture of the cloth.

In the various subsequent processes of cutting, stamping, shading and mounting, to which the material must be subjected, before the plain cloth becomes the artificial leaf, the arsenical green which is used to produce such a close resemblance to natural verdure, inevitably escapes in greater or less abundance and mingles with the ordinary dust of the apartments in which the manufacture is carried on. Moreover, some of the special methods which are employed to perfect the work promote the

dissemination of the powder; thus in the operation called "fluffing," which consists in dipping the leaf into warm wax and immediately dusting the dry color upon it from a dredging-box, the workman is particularly exposed to the effects of the freely floating particles. All the manipulations, in short, subject the material to varying degrees of violence by which the arsenical powder is detached. This powder is inhaled by those exposed, and the precaution, sometimes employed, of placing towels or other masks before the mouth and nostrils cannot furnish absolute protection to the wearers. The moist skin attracts the dust, and the clothes give it lodgment. The soiled hands are not often perfectly cleansed before they are used to convey food to the mouth, and an additional source of risk is thus provided.

The quantity of arsenic which, in the various processes of their manufacture, these artificial leaves are sometimes made to take up would appear almost incredible. Careful chemical analysis has determined this amount repeatedly. Hofmann found in a single twig of twelve leaves, ten grains of pure arsenic. A lady might thus carry, in all innocence, to an evening party enough arsenic in her floral adornments to destroy herself and a score of her fellow guests.

The effects which exposure to the arsenic contained in artificial leaves may produce, either in those engaged in their manufacture or in those who use them, have been renewedly made the subject of careful investigation. Intelligent and impartial scientific observers in France, Germany and England do not hesitate in declaring the pernicious influence of continued exposure to such conditions, and numerous instances are cited to demonstrate not only harmful but occasionally fatal effects. An investigation was made by M. Vernois in 1859, concerning the accidents resulting among the flower-makers of Paris from the use of arsenical greens, and, as the result of his researches, he points out many symptoms which, he believes, may be directly traced to arsenical infection. Among these are included various eruptions on the skin, presenting sometimes a papular form, sometimes vesicular, sometimes a simple diffused redness (erythematous), and sometimes developing to ulceration and gangrene, the seat of the disease being preferably those parts exposed most directly to the irritant action of the

poison, as, for example, the hands and face, the former especially presenting ulcerations, if the color enters cuts or abrasions; along with these external symptoms, are loss of appetite, nausea, colic, continued headache, pallor and debility.* Dr. Hassall, writing in England at about the same period, in describing one of his visits to a manufactory of artificial flowers in London, states:—

"In the same room were two men, eight women and two boys, the condition of all being wretched in the extreme. They were all similarly affected. They all had sores, the girls, at the back of the neck, on the sides of the nose and on the hands; their eyes also were affected, and there was running from the nose. To such an extent was their health affected that they were obliged from time to time to give up their work and return home." †

Dr. Hillier, too, investigated the condition of the London flower-makers in 1861, and found that they "suffered from chronic inflammation of the stomach and bowels, irritation of the eyes, great nervous debility and prostration, with local irritation of the skin of the hands, neck and scalp when the powder was brought into contact with and allowed to remain on those parts." Several work-people stated that they were constantly ill while working with this powder ‡

But besides these generally acknowledged symptoms of chronic arsenical poisoning, as manifested in these people after working continuously with emerald green, still more serious results are possible, and cases are recorded of fatal effects upon specially susceptible organisms. The following is illustrative: In 1861, a girl, aged nineteen years, who had been engaged continuously during eighteen months in making artificial flowers with emerald green, died in London with all the characteristic symptoms of chronic poisoning by arsenic. Her sufferings were very greatly intensified toward the close of life. Examination after death discovered the very evident presence of arsenic in the internal organs §

These exceptionably fatal cases bear very small proportion,

* Annales d'Hygiène, 2d Ser. Tome XII., p. 319.
† Lancet, 1860, p. 535.
‡ Fifth Rep. Med. Officer, Privy Council, 1862, p. 126.
§ Med. Times and Gazette, Nov. 30, 1861.

it is true, to the numerous well authenticated instances of less serious results which are notorious among the operatives themselves as arising in their vocation. This is explained partially by the fact that such fatalities might readily be ascribed to other causes, supposing them to occur more frequently, while on the other hand it is obvious that persons exposed to such a noxious influence would probably desist from this work long before the symptoms were serious enough to threaten a fatal termination.

But not only do the operatives, who in making the artificial flowers use the arsenical greens, suffer in proportion to their susceptibility and exposure, but in many cases also those who wear them, and those who, like shop-keepers and milliners, habitually handle them. A case is reported of a clerk who always had vertigo, headache, nausea and cough whenever he opened and handled new packages of green artificial foliage.* In another instance which is recorded, a lady's shoulders became the seat of a painful eruption directly after each occasion of wearing a wreath of artificial flowers and leaves at evening receptions; and in two other reported cases, an erysipelatous eruption on the forehead was traced to a similar cause.† The physicians to some of the large London hospitals have expressed themselves as familiar with "the inflamed eyes and disfiguring eruptions," which, as they assert, result from the use of the arseniferous verdure.

It is obvious that of such cases only the most remarkable and clearly defined would be reported; and we may reasonably infer from these that many less distinctive instances really occur. It is not unreasonable to suppose, for example, that the health of milliners, proverbially delicate as a general thing, may depend for its deterioration to some extent upon this factor, as well as upon overwork, crowded and ill-ventilated rooms and insufficient exercise. It is bad enough to inspire an ordinarily foul atmosphere, but it can certainly add nothing to atmospheric purity to mingle with the dust of a room any proportion, however small, of oxide of copper or of white arsenic.

Closely related to the foregoing topic, is the use of the arsenical green pigment in the manufacture of other articles of dress;

* Dublin Quar. Jour., Vol. XXXII., p. 234.
† Dublin Quar. Jour., loc. cit.

and among these the material called tarlatane, a light fabric resembling muslin, has attracted much attention. The mineral green with which the material is colored recommends itself because of the brilliancy of its shade and of its permanency by artificial light; and the fabric has therefore at times been quite fashionable. A considerable quantity of it is still sold for dresses, or for the trimmings used by milliners. It is known popularly as an "arsenical" green, so that its character is not altogether unrecognized.

In the manufacture of this material, the color is fixed only by starch or size, and when tarlatane is torn, a plentiful cloud of light green arsenical dust arises. The slightest agitation also serves to disengage the colored powder, and to diffuse it through the adjacent air. It is easy to discover how readily the wearer of one of the expansive dresses prescribed by fashion might under certain circumstances surround herself with a cloud of poisonous dust of whose effects on herself and on those about her she would be unhappily ignorant.

The arsenical-green tarlatanes contain nearly half their weight of coloring matter. A sample, procured by the writer in one of the retail stores of Boston, was analyzed quantitatively by Prof. William Ripley Nichols at the Massachusetts Institute of Technology, and found to contain 8.21 grains of arsenious acid (white arsenic) to each square foot. A dress of ordinary dimensions would thus hold feebly in its texture between three and four ounces of pure arsenic.

It would not seem probable that the occasional wearing of such a material would produce symptoms of serious harm to either the wearer or to those around her, the noxious exposure in such cases being limited in time and degree. Yet instances are not wanting to demonstrate its deleterious effects on those engaged in making the fabric into dresses. In one case, reported by Chevallier, five dress-makers were more or less seriously affected after working on the tissue.* Two years ago a similar instance of poisoning occurred in France, where arsenical greens are prohibited by law; and the dress was found to contain nearly eight ounces of arsenic.† On one occasion, where a new ballet was performed at Hamburg, the dancers

* Annales d'Hygiène, XII., p. 99.
† Chemical News, Sept. 10, 1869.

it is true, to the numerous well authenticated instances of less serious results which are notorious among the operatives themselves as arising in their vocation. This is explained partially by the fact that such fatalities might readily be ascribed to other causes, supposing them to occur more frequently, while on the other hand it is obvious that persons exposed to such a noxious influence would probably desist from this work long before the symptoms were serious enough to threaten a fatal termination.

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* Dublin Quar. Jour., Vol. XXXII., p. 234.
† Dublin Quar. Jour., loc. cit.

and among these the material called tarlatane, a light fabric resembling muslin, has attracted much attention. The mineral green with which the material is colored recommends itself because of the brilliancy of its shade and of its permanency by artificial light; and the fabric has therefore at times been quite fashionable. A considerable quantity of it is still sold for dresses, or for the trimmings used by milliners. It is known popularly as an "arsenical" green, so that its character is not altogether unrecognized.

In the manufacture of this material, the color is fixed only by starch or size, and when tarlatane is torn, a plentiful cloud of light green arsenical dust arises. The slightest agitation also serves to disengage the colored powder, and to diffuse it through the adjacent air. It is easy to discover how readily the wearer of one of the expansive dresses prescribed by fashion might under certain circumstances surround herself with a cloud of poisonous dust of whose effects on herself and on those about her she would be unhappily ignorant.

The arsenical-green tarlatanes contain nearly half their weight of coloring matter. A sample, procured by the writer in one of the retail stores of Boston, was analyzed quantitatively by Prof. William Ripley Nichols at the Massachusetts Institute of Technology, and found to contain 8.21 grains of arsenious acid (white arsenic) to each square foot. A dress of ordinary dimensions would thus hold feebly in its texture between three and four ounces of pure arsenic.

It would not seem probable that the occasional wearing of such a material would produce symptoms of serious harm to either the wearer or to those around her, the noxious exposure in such cases being limited in time and degree. Yet instances are not wanting to demonstrate its deleterious effects on those engaged in making the fabric into dresses. In one case, reported by Chevallier, five dress-makers were more or less seriously affected after working on the tissue.* Two years ago a similar instance of poisoning occurred in France, where arsenical greens are prohibited by law; and the dress was found to contain nearly eight ounces of arsenic.† On one occasion, where a new ballet was performed at Hamburg, the dancers

* Annales d'Hygiène, XII., p. 99.
† Chemical News, Sept. 10, 1869.

it is true, to the numerous well authenticated instances of less serious results which are notorious among the operatives themselves as arising in their vocation. This is explained partially by the fact that such fatalities might readily be ascribed to other causes, supposing them to occur more frequently, while on the other hand it is obvious that persons exposed to such a noxious influence would probably desist from this work long before the symptoms were serious enough to threaten a fatal termination.

But not only do the operatives, who in making the artificial flowers use the arsenical greens, suffer in proportion to their susceptibility and exposure, but in many cases also those who wear them, and those who, like shop-keepers and milliners, habitually handle them. A case is reported of a clerk who always had vertigo, headache, nausea and cough whenever he opened and handled new packages of green artificial foliage.* In another instance which is recorded, a lady's shoulders became the seat of a painful eruption directly after each occasion of wearing a wreath of artificial flowers and leaves at evening receptions; and in two other reported cases, an erysipelatous eruption on the forehead was traced to a similar cause.† The physicians to some of the large London hospitals have expressed themselves as familiar with "the inflamed eyes and disfiguring eruptions," which, as they assert, result from the use of the arseniferous verdure.

It is obvious that of such cases only the most remarkable and clearly defined would be reported; and we may reasonably infer from these that many less distinctive instances really occur. It is not unreasonable to suppose, for example, that the health of milliners, proverbially delicate as a general thing, may depend for its deterioration to some extent upon this factor, as well as upon overwork, crowded and ill-ventilated rooms and insufficient exercise. It is bad enough to inspire an ordinarily foul atmosphere, but it can certainly add nothing to atmospheric purity to mingle with the dust of a room any proportion, however small, of oxide of copper or of white arsenic.

Closely related to the foregoing topic, is the use of the arsenical green pigment in the manufacture of other articles of dress;

* Dublin Quar. Jour., Vol. XXXII., p. 234.
† Dublin Quar. Jour., loc. cit.

and among these the material called tarlatane, a light fabric resembling muslin, has attracted much attention. The mineral green with which the material is colored recommends itself because of the brilliancy of its shade and of its permanency by artificial light; and the fabric has therefore at times been quite fashionable. A considerable quantity of it is still sold for dresses, or for the trimmings used by milliners. It is known popularly as an "arsenical" green, so that its character is not altogether unrecognized.

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* Annales d'Hygiène, [illegible].

† Chemical News, [illegible].

who represented water-nymphs, were dressed in green tarlatane. These dresses "nearly cost the lives" of those who made them and of those also who wore them. So large was the quantity of arsenic in the fabric that nearly all were more or less poisoned.*

In 1869, a case of poisoning from the cause under consideration occurred in Boston, the details of which were given to the writer by one of the persons affected. Four dress-makers, while engaged upon some party-dresses of which the material was arsenical green tarlatane, became simultaneously affected with well-marked symptoms. These symptoms consisted of swelling of the hands and face, a "pimply" eruption on the back of the hands and about the nostrils, running from the nose and free lachrymation. With these local effects were headache, lassitude and a feeling of general illness. The attack coming on in the midst of perfect health and affecting all but one of those who worked upon the arsenical fabric, left little doubt in the minds of the sufferers of the nature of the poison. The symptoms subsided as soon as the exposure ceased.

II. *Confectionery, Pastry Ornaments and Toys.*—It would seem hardly possible that any person, save the most reckless or the most malicious, would designedly introduce into articles of food agents of such poisonous potency as the green colors containing arsenic. Ignorance of the properties of Schweinfürt green must have been the only extenuation for the great majority of those confectioners who have ever made use of that substance to impart to their wares a luring but most treacherous color. Doubtless all the coloring materials which are used so abundantly to give to candy its variegated hues should justly be subjected to the closest scrutiny, and many of them should be unconditionally condemned in view of the baneful effects which they necessarily produce, especially in children. It needs no argument to demonstrate the probable results of the swallowing of even the smallest portion of a coloring material which contains more than one-half its weight of pure arsenic; and a single word of warning ought to suffice to banish such sugar-coated poison from candy-shop windows.

* Medical Times and Gazette, April 11, 1863.

It is a matter for congratulation that, as the result of stringent regulations in other countries, together with a more general enlightenment of the public in such matters, accidents from the use of the metallic pigments in confectionery are now comparatively rare. Repeated and fearful experiences in the past, of which the victims were chiefly children, have borne their fruit. It would probably be a difficult task at the present day to find the arsenical greens designedly incorporated as a color into any candy intended for eating. It would be better for the community if experience had taught similar abstinence concerning the green pigments in other relations.

Accidents do, however, occasionally occur from the ornaments with which confectioners adorn their pastry, and which are not meant to be eaten. These are not infrequently colored in the most reckless manner with emerald green. Misadventures from this source generally affect children who, attracted by the color and the candy-like aspect of the ornaments, eat them inadvertently. A number of cases of this sort are reported. In one such instance, two children ate a portion of a cake-ornament which was colored green, and narrowly escaped death. Ten grains of the colored pastry contained nearly two and a half grains of arsenic.* Dr. Fergus reports a similar experience, in which three children were poisoned, exhibiting all the typical symptoms of the effects of arsenic.† In 1857, in Edinburgh, eighteen persons were made very seriously ill, and one child died, after eating a pastry ornament which owed its green color to arsenite of copper.‡

The ingenuity of caterers has sometimes shown itself in the presentation of the triumphs of their art in a unique manner. M. Chevallier relates that at a grand dinner-party in Paris, attention was directed to a boar's head which had been curiously decorated for the occasion. The ornament consisted of masses of fat, colored alternately red and green, so arranged as to give quite an artistic effect. One of the guests, well acquainted with chemistry, was struck with the rich green color, and reserved a portion for private analysis. He found the coloring matter to be pure Scheele's green, forming about two

* London Med. Times, 1849, p. 107.

† London Med. Gaz., Vol. 43, p. 304.

‡ For numerous other cases, see Taylor on Poisons, 2d Ed., p. 431.

per cent. of the weight of the fat. It appeared, on inquiry, that the butcher's boy had procured the color from an adjacent shop, in spite of the regulation prohibiting its sale.*

The toys of children are a medium by which these poisonous pigments may be introduced into the system and cause grave accidents. Many of the green wooden toys are painted with Schweinfürt green loosely applied, the color being mixed with water only and smeared on the wood, instead of being more securely fixed upon the material by means of oil or varnish; and when one remembers the instinctive habit of young children to carry to their mouths whatever their hands contain, the liability to injury is at once apparent. Moreover, children's hands are always moist, and this moisture can readily dissolve and detach the loosely applied color. The hands thus soiled are put to the face, and, as likely as not, in the mouth. This custom of using the metallic colors on toys is the more reprehensible since it is wholly unnecessary, or, if any color is desirable, vegetable pigments should be substituted. Chevallier cites two cases of acute arsenical poisoning in children from the source alluded to, and remarks: "It is a matter of surprise that other cases have not been brought to the notice of the public, since children are so often seen playing with those cheap toys, with their hands abundantly daubed with yellow, red and green."†

The boxes of water-colors which are in such common use as a plaything for children, contain generally two blocks of green paint, one being of a dark and the other of a light shade. The latter consists of arsenical green. A tablet of this kind, weighing 38.26 grains, was analyzed for the writer by Mr. A. H. Pearson at the laboratory of the Massachusetts Institute of Technology, and found to contain 8.89 grains of arsenic. A child in using these paints will frequently carry the brush to his mouth in order to moisten it with saliva before applying it to the color, and sometimes the paint is itself touched directly to the tongue. It is marvellous that more frequent cases of poisoning from this source do not occur, because not only the green color, but others also of the blocks, are composed of matters of a positively harmful nature. Must it not be considered

* Annales d'Hygiène, new ser., Vol. XII., p. 69.
† Annales d'Hygiène, new ser., Vol. XIX., p. 304.

as hardly less than criminal in the manufacturers of toy paint-boxes to distribute a color containing so large a proportion of one of the most irritant poisons?

It has happened that children, too young to know the use or nature of these paints, have eaten portions of them and have been seriously poisoned in consequence. Such an instance was reported in 1859 by Dr. Rose; the child took only a small fragment of a green paint, and in half an hour he became cold, pulseless, and fully collapsed. Only by the vigorous application of the proper antidotes to arsenic was the child's life saved.* Four cases, precisely analogous in character, are recorded by Chevallier.†

III.—The arsenical pigments are sometimes used in the *inside painting of houses*, and in this relation they merit a single word. The dangers to health arising from this source are, of course, comparatively unimportant in this country where taste and fashion prescribe the general use of white lead for these purposes of house painting. In some parts of Europe, however, the use of mineral green has been deemed a matter of sufficient importance, on account of its extent, to warrant an investigation into the effects which may occur. M. Kirchgässer of Coblentz published, in 1867, the results of his researches on this subject, and demonstrates the deleterious effects of habitually staying in rooms on whose walls is a coating of arsenical green. The symptoms in such cases are those of chronic arsenical poisoning, and they are identical with those due to exposure under other circumstances; the most characteristic are excessive debility, intermitting pains, cold extremities, a cachectic aspect, and sometimes the appearance of brown patches on the skin.

Dr. Lorinser also asserts his unqualified opinion that chronic arsenical poisoning may occur in consequence of the occupancy of rooms whose walls are painted green, and which owe their color to the arsenical pigments. Numerous cases occurring in his own experience are cited to demonstrate his statements.‡

The following instance illustrates how accidents may arise through inadvertence from the use of arsenical-green paint.

* Lancet, 1859, Vol. I., p. 237.

† Annales d'Hygiène, Vol. XII., p. 94, new ser.

‡ Wiener Med. Wochenschr. 1859. Nos. 43 and 44.

The experience is not improbable in our own community where the paint is sometimes used on shelves and such other limited surfaces. A distinguished English chemist, Prof. Taylor, observed, adherent to the under crust of the loaf of bread, which had been placed one morning before him for breakfast, certain well-marked patches and streaks of a green color, having somewhat the appearance of green mould. He removed some of the suspicious matter and, subjecting it to analysis, proved it to be composed of "Scheele's green, containing about fifty per cent of arsenic." There was enough on one of the loaves to have killed an infant. On inquiry it was ascertained that the baker, from whom the bread had been purchased, had just had his shop newly decorated, and there were eight long shelves (holding some hundreds of loaves) painted a bright grass-green color, top, front and sides. A number of the loaves were examined in succession and it was found that they were all similarly stained. They had been placed while warm on the shelves and had absorbed a quantity of the freshly applied poisonous pigment. "The baker expressed his ignorance that there was arsenic in the paint; but the painter who was summoned took the matter more coolly and professionally, remarking that it was impossible to get a good green without arsenic, that he had used it for many years and he had never heard of any one being killed by it." The author remarks: — "It is easy to conceive that an accident of this kind, if undetected, might lead to serious results, and perhaps to very erroneous suspicions." *

A case analagous to the foregoing occurred in Vienna. An entire family were made seriously ill by eating strawberries which had been kept a few hours in a box whose inner surface was painted green. The paint, on analysis, was found to be colored with arsenite of copper.†

IV. Every person must be familiar with the appearance of the brilliant *green paper* which is used so extensively for covering paste-board boxes, for show-cards, for tickets, for wrappers, for lamp-shades and for a great number of similar purposes. This paper owes its bright tint in all these forms to the presence of arsenite of copper. It contains a large amount of the poison-

* Med. Times and Gazette, April, 1854, p. 326.
† Oester Med. Wochensch. 1841.



ous material in proportion to its weight. The sample herewith presented contains, according to the analysis of Mr. Pearson, 8.67 grains of arsenic in each square foot.

The accidents to which this method of employing arsenic may give rise are, as will readily be seen, chiefly of an acute order, and grow out of the danger, to which children are especially liable, of swallowing the poison in the manner alluded to in connection with toys. The matter has received particular attention in France, and the use of arsenical-green paper for the purpose of enveloping articles of food, confectionery and the like is absolutely prohibited; in his instructions to his subordinate officers, the Prefect of police of Paris applies the interdiction of these papers to "bags, envelopes, boxes or labels as used by all dealers in provisions or articles of food whatsoever."*

Such a sweeping proscription would certainly appear impracticable in our own community, but it serves to illustrate the magnitude of the subject as it is regarded in other countries. Certainly the very general use of the material in question, under a great variety of forms, must be obvious to the most casual observer, and when the eye once becomes accustomed to the characteristic shade, and looks for it, it is surprising to observe to what a multiplicity of uses the paper is applied. It will not be unprofitable, therefore, to utter a word of warning concerning the dangers which are possible, and to cite cases which exemplify them.

Perhaps the most reprehensible use to which the green paper is put is as a wrapper to packages of confectionery, chocolate and the like, a practice which is becoming too common. One of the most reputable of the confectioners of Boston displays in his windows and on his shelves, with other confectionery of his own manufacture, rolls of lozenges enveloped in the bright green paper; and the same custom is to be repeatedly observed in other stores. Children, readily allured by the bright tint, obtain this candy, and if they do not swallow a portion of the poison with the sweetmeat, are not generally unready to put the paper wrapper to their mouths, child fashion. A case is recorded by Chevallier in which a child was poisoned in this manner by a piece of green paper. The mother of the child

* Circulaire aux Com. de Police de Paris, Nov. 28, 1855.

had given him a fragment of chocolate around the end of which, for the sake of neatness, she had wound a portion of the paper in which it was originally enveloped. In sucking the candy, the child also took into its mouth some of the coloring matter from the paper, and narrowly escaped death in consequence.*

An accident like the following is liable to occur at any time to an organism equally sensitive to the action of poisons, where price-cards covered with arsenical green are so freely used.

"A lady purchased a quantity of prunes of which she cooked a portion. Soon after eating some of them she was attacked with vomiting, which continued several hours. Not suspecting the cause of her illness she took more of the prunes and suffered a recurrence of the symptoms. Then it was noticed, on careful search for the cause of her trouble, that some of the fruit was stained with green. On returning the prunes to the grocer, he recognized the fact that the color proceeded from a green price-card which had rested on them; the fruit being moist had taken up a portion of the coloring matter from the paste-board. The pigment was found to consist of Scheele's green." †

The instance which follows is also suggestive of a quite common exposure:—

"A watchmaker had a very troublesome and irritable ulceration of the mucous membrane of the mouth. The smarting and annoyance were almost intolerable, and became much increased in the evening, when the lips swelled and became so painful that eating or even speaking could scarcely be indulged in. In prosecuting his work, he was in the habit, in the evening, of using a gas-light, before which to protect his eyes he had a bright green paper shade. On analysis, the color of the shade was found to be due to the presence of aceto-arsenite of copper (Schweinfürt green). The heat from the light was believed to have decomposed a portion of the arsenical pigment, producing the characteristic odor and causing the acute symptoms in the workman. Speedy recovery followed the disuse of the shade." ‡

In 1861, the following case occurred in Boston, and was reported in one of the local medical societies. A young child,

* Annales d'Hygiène, XIX. p. 304.
† Annales d'Hygiène, XII. p. 71.
‡ Lancet, Jan. 7th, 1860, p. 8.

in playing with a small green concert-ticket, put it to his mouth and detached and swallowed a portion of the pigment. Violent symptoms followed. A duplicate ticket was analyzed quantitatively by Dr. C. T. Jackson and was found to contain in its green coating nearly two grains of pure arsenic.*

V. *Paper-hangings.*—Important as are the topics which have thus far engaged our attention in the study of the arsenical greens and of the possible dangers incident to their use, they appear to have always been considered as of less significance than those relating to arsenical paper-hangings. Since Prof. Gmelin of Heidelberg called attention, in 1843, to what he deemed the deleterious effects of living in rooms whose walls were decorated with green paper, the subject has been repeatedly investigated in all its relations. Distinguished scientific authorities in Germany, France, England and America have regarded the matter as one eminently deserving careful consideration, and the unanimity which characterizes the results of their studies can leave little room for doubt in unprejudiced minds concerning the harm which may ensue, under certain conditions, from the use of arseniferous wall-paper. Other observers, comparatively few in number, who have arrived at negative or at wholly dissenting conclusions seem to have based their experiments on wrong premises or to have shown partiality in their statements.

As a result of the unequivocal warnings published by physicians in past years, the use of the arsenical paper-hangings became for a time and in some degree unfashionable. But the dictates of fashion are capricious, and are not long mindful of the protests of science. The public has forgotten the experiences of ten years ago and the poisonous paper-hangings are displayed in the shops to-day with the same fascinations of color, design and finish that has characterized them in the past. In every store which the writer has visited in the course of these investigations, specimens of the paper have been obtained which, on being tested, exhibited the presence of the arsenical pigment in a greater or less degree.

This renewal of a practice which has been condemned heretofore in terms of unconditional disfavor justifies a renewed

* Boston Med. and Surg. Jour. Vol. 64, p. 121.

investigation of the subject. It is a matter of no ordinary importance to a community to know that, by the use of paper-hangings of a certain color, the health of individuals is seriously jeopardized. It is not a pleasant thing to realize that the very means we take to make our homes more cheerful may become the direct source of impaired health, and that the beautifully artistic designs which decorate the rooms in which we live or sleep may be the subtle agencies whereby the sum of human misery is increased.

It ought to be remembered, at the outset of this inquiry, that all paper-hangings which are green are not to be condemned as poisonous. Not a small proportion owe their tint to other pigments than the arsenite of copper. And this fact that the arsenical papers are found in comparatively good company adds another element of importance to the subject, suggesting the greater need of discrimination. Moreover, with regard to paper-hangings which are actually arsenical, it will be perhaps exceptional to find specimens colored to any great extent with the unadulterated arsenite or aceto-arsenite of copper, as distinguished by the purity and brilliancy of the green tint, because it is the custom of the manufacturers to modify the shade of green by the addition of substances which shall make the tint darker or lighter to suit varying tastes; yet the primary pigment contains arsenic, whose presence can be detected only by the chemist's tests and not by any distinctive physical appearance. To proscribe a wall-paper, therefore, because it is green, and, without farther test, to condemn it even though it be found on the room of a confirmed invalid, would be hasty judgment; while, on the other hand, cases undoubtedly occur in which obscure and distressing symptoms are due to arsenical poisoning, the agent being concealed in a tint bearing so distant a resemblance to the brilliancy of pure emerald green as to readily escape detection.

In the manufacture of paper-hangings, no provision is made with a special view of anticipating and preventing any possible harm which may result from the employment of the arsenical pigment. Whether the pattern be a plain or a figured one, the coloring matter is made to adhere to the paper by means of size. The emerald green, generally adulterated with Paris white or some other neutral agent in order to obtain the

d shade, is mixed with warm water in which size has been ed; in this process of color-mixing the workman often is hands, plunging the fore-arm nearly up to the elbow e sieve through which the ingredients are passed. When lor is prepared, it is applied to the surface of the paper ans of a series of brushes, worked by machinery, and a m coating is thus quickly secured. Passing from this ne, the paper is suspended in long loops from sticks rest on a slowly moving, endless chain arranged near the ; being carried thus in loops the length of a long room temperature is maintained at a high degree by steam tus, the paper becomes thoroughly dried. If it is to be ed" or glazed, it is passed through a series of dry s which revolve with great rapidity. The figured pat- are printed by two methods. The slower, but more te process, and therefore better adapted for fine work, is d-printing, the pattern being secured by blocks, a color me, precisely as in the earliest days of paper-hangings. ost of the printing is done by machinery not unlike that n calico-printing. The paper is passed against a series olving wooden cylinders on whose surface are raised fig- orresponding respectively with the individual shades of o be observed on the paper when finished; each cylinder with its own pigment by means of a revolving belt of fine n, which passes through a trough of color. The variety "flock-paper" requires a special process to give it the nown roughened or velvety aspect. The flock consists of ely divided shreds of waste woollen cloth. The stock is d and dyed. It is then stove-dried and ground to a fine r; the requisite degree of fineness is secured by succes- ifting in a bolting apparatus. A quantity of this n dust is enclosed in a large chest or drum, the bottom of consists of sheep-skin or of strong cloth. The paper is epared with a layer of size and then of varnish. If the is to be a plain flock, this adhesive material is spread nly; if figures are desired, the pattern only is printed in 1. Successive portions of the paper are passed into the and the bottom of the chest being beaten, the flock dust d to settle on the still moistened and adhesive surface, it is allowed to dry.

From this description it will be seen that the arsenical paper-hangings include three well-defined varieties, according to the methods used to attach the coloring matter to the surface of the paper with greater or less degree of permanency: they are unglazed, or satined, or flock. These comprise all grades, from the most costly to the cheapest, and vary from the plainest surface to the most elaborately figured designs. In some, there is a thick coating of the color, loosely applied, either for a perfectly undecorated paper or to serve as a ground on which to impress the various figures. In others, only isolated or small patterns of foliage contain the green pigment. Of all the varieties, however, those which have an unglazed surface are the most likely to produce harm, since in this class the color is only moderately adherent, and is removed by the slightest friction. The glazed papers are less open to this objection, because the process which gives the polish serves also to fix the pigment more securely. From such a surface the green dust would not escape readily, until, after long wear or by frequent dusting, abrasions in the glazing were produced. The flock papers occupy an intermediate place between the two varieties alluded to. The wool which constitutes the flock is generally of a dark green color from vegetable dyes; and if the arsenical pigment is used, it is found in the ground tint on which the flock is laid or in the green-figured foliage formed in the intervals. The flock as primarily prepared is not poisonous; but it may become so, since it is easily detached from the paper and may bear away with it particles of the subjacent color.

The quantity of the poisonous color which is used upon these papers varies exceedingly, of course, but occasionally it is found in very large amount. Prof. Bacon asserts: "Frequently so much as fifty or sixty grains of the arsenical pigment is spread on each square foot of the paper."* In a specimen examined by Dr. Halley, nearly a drachm of the color was found in the square foot;† and Dr. Taylor states the results of his analyses to vary from twenty-eight to seventy grains in the same surface ‡ Two samples of the paper are presented here-

* Boston Med. and Surg. Jour., Vol. 69, p. 490.
† Med. Times and Gazette, Jan. 16, 1868.
‡ Taylor on Poisons, p. 434.



1. They have been analyzed for the writer by Mr. Pearson
he Institute of Technology. The lighter-colored specimen
tains 5.42 grains of arsenic in each square foot. The paper
shows under what a deceptive guise the arsenical pigment
appear. The second sample, which is typically arsenical,
which represents the color in its purity, has 29.32 grains
pure arsenic in each square foot. Taking the average of
e results, a room of ordinary dimensions, decorated with
nical paper-hangings would hold on its walls considerably
e than a pound of a poisonous coloring matter, containing
its weight of arsenic.

The question, however, which most concerns us is, Does the
ence of this pigment, in such large amount, on the walls of
ns habitually occupied by day or night, exert any delete-
s influence on the health of the occupants? Can an agent,
wedly very poisonous when swallowed, become disengaged
ny way, directly or indirectly, from the surface to which it
ut loosely attached, and contaminate the atmosphere to
a degree as to produce by slow but continuous absorption
istakable symptoms of injury? There will be those who,
ugh incredulity or from motives of interest, will cite cases
erfect immunity under such conditions and will maintain
the brilliant color is inert, even granting the presence of
nic, and that there is nothing in the paper-hangings in
stion to arouse alarm or suspicion. The alleged cases of
ess from this cause ought rather, they say, to be attributed
ad ventilation and other abuses. Nevertheless, when the
y recorded and well authenticated instances of impaired
lth, including a considerable number which have terminated
lly, are examined impartially, little room is left for skepti-
n. The cases are too numerous and too unequivocal to be
wn aside, and constitute a mass of evidence which cannot
be refuted. It will be unnecessary to cite a great num-
of these cases here. The columns of the medical and of
general press of the last ten years contain the histories of
nerous instances; and of these only a few of the typical
s will be quoted as illustrations.

r. Halley of London, has reported a case of arsenical poison-
in which he was himself the victim. His library-walls had
covered with a newly made, rich, emerald-green flock-

paper. Shortly after the work was finished, he commenced to occupy the room regularly every evening, for some five or six hours, a single gas-burner supplying the light. After a few days he began to suffer considerably in health; there was constant headache, dryness of the throat and tongue, with internal irritation. After three weeks of this experience, he became completely prostrate, not yet, however, suspecting the cause of his malady. Partial paralysis of the left side supervened. His condition obliged him to discontinue his studies in his library, and coincident with this intermission he began at once to recover. But as soon as he recommenced his labors, the symptoms recurred. His attention was now called to the paper on the walls of the apartment. It was found to contain nearly sixty grains of Scheele's green to the square foot. The air of the room was likewise tested, and distinct crystals of arsenic were obtained from the dust. The paper was at once removed and there was no farther trouble.*

In 1862, a case of fatal poisoning under the conditions in question occurred in the suburbs of London, the victim being a child. The cause of death was made the subject of an investigation before a coroner's jury. In the course of the evidence it transpired that the deceased was the last of four children who had died within a period of two months under exposure to the poison contained in the paper-hangings of the room they habitually occupied. They had all been attacked in the same manner, the prominent symptoms being referred to the throat. The color was loosely applied, having no glazing. It was very deliquescent; at 50° it was quite damp and the stain came off on the hand like paint. Three grains of arsenic were found in a square foot of the paper. The symptoms were attributed by the surgeon in attendance, Mr. Orton, and by Dr. Letheby, who made the *post mortem* chemical examination, to arsenical poisoning.†

In a case reported by Dr. Guy, the patient being a young lady, there were observed gastric irritation, emaciation, flatulence, pain in the abdomen, loss of appetite, nausea, a furred tongue, dryness of the mouth and throat, a quick, small pulse, oppressed respiration with dry cough, failure of strength, an

* Med. Times and Gazette, Jan. 16, 1858.
† Med. Times and Gazette, May 3, 1862.

aversion to food and drink, a blanched complexion. Temporary absence from home brought relief to the sufferer, but it was not until after recurrences of the symptoms coincident with the return to the arsenical room, that the wall-paper was suspected. The paper was removed and a plain white paper took its place, and no further symptoms of poisoning were experienced. The workman who removed the arsenical paper was very ill the whole night and day following, "with cramps, sickness and pain." The green paper was a glazed watered pattern, covered with two shades of the most delicate tint.*

Dr. Hinds reports an experience not unlike that of Dr. Halley. He says:—

"In 1849, I ordered my study to be re-papered, and I selected for this purpose a neat paper, with only about two shades of green, of a bright and elegant tint. In a day or two after the room was papered I began to use it. I had a fair gas-light, and towards evening I began to read. When about an hour and a half to two hours had passed, symptoms of severe depression seized me, soon followed by a feeling of nausea and an inclination to vomit. There were occasional pains in the abdomen also, and the prostration was presently accompanied with a feeling of faintness which suspended my operations. The very same thing occurred every successive evening, when the door of the room was closed, the gas-light burning, and after I had remained about a couple of hours in the room. The unpleasant symptoms gradually subsided when I had left the room, a feeling of faintness and some stomachic derangement alone remaining."

The green pigment, on being sublimed in a test-tube gave abundant crystals of arsenious acid. The paper was removed and the annoyance never reappeared.†

Dr. Hinds also reports other cases under his personal observation. In one of these, a gentleman of Birmingham had two parlors papered with a bright green paper. In less than a week afterwards, both himself and his wife, previously in good health, became ill. They were in the habit of sitting in one of the rooms regularly. The symptoms complained of were great prostration of strength, headache, and a low, febrile condition, together with inflammation of the eyes (conjunctivitis), thirst, loss of appetite,

* Fifth Report, Medical Officer, Privy Council, p. 137.
† Med. Times and Gazette, May, 1857.

heat and dryness of the throat, with tightness across the forehead. The great inaptitude for exertion and general prostration of the strength appeared prominent. As in the previous cases, temporary absence from home was attended with a remission of the symptoms, and the removal of the paper was followed by early and complete restoration of health. The paper was of the "flock" variety, with a profuse pattern of a light and elegant green on a flock ground, yielding, on analysis, an abundance of arsenic.*

Dr. James Whitehead of Manchester, England, has recorded an instance which may be cited as a typical one, not only as illustrating the disease in question, but as affording an example of the difficulties sometimes experienced in determining its true character. The patient, a young man, suffered from ulceration of the gums and of the tonsils, violent frontal headache, great languor, nausea and occasional vomiting, inappetence for exertion, and disturbed sleep. The complaint, mild at its onset, gradually increased in severity in spite of medical treatment, and at the end of eight or ten weeks the patient was removed to the country; here he was speedily restored to health. On his return home, perfectly well, he was placed in the same room he occupied before; in the space of four weeks he was worse than ever. The drains being suspected of some indirect influence in causing the diseased condition, they were examined, but nothing was discovered to account for the trouble. Attention was next directed to a cistern which adjoined the wall outside the patient's room, and it was remodelled with the hope of remedying the mischief. The repairs necessary for this change required the patient to occupy another room for a fortnight; this intermission was attended with considerable relief, and he returned to his old apartment feeling much better. The former symptoms recurred with aggravated severity, and now for the first time it was suspected that the wall-paper was the source of the mischief. The paper was replaced without loss of time by one of a totally different shade, and results every way satisfactory followed. There was no relapse of the symptoms after the removal of the paper, and the young man occupied the room without further annoyance.

The paper was a "rich, green, flock paper." While it was

* Med. Times and Gazette, May, 1857.

being applied, a green dust escaped freely; and afterwards, whenever the walls were cleaned, a similar powder was found on the furniture. Thirty grains of the pigment yielded, on chemical analysis, eleven grains of arsenic, and it was estimated from this that the room, having a superficies of three hundred and fifty square feet, held in its paper-hangings, after four years of usage, 3,850 grains or about a half a pound of white arsenic.*

But in studying the reported cases of wall-paper poisoning, we need not confine our selections to observations made in other countries. Abundant testimony is afforded in our own midst; and this fact, that the pernicious effects of using the arsenical paper-hangings have been recognized and experienced here, and that cases have repeatedly occurred demonstrating the susceptibility and exposure of our own people, is of obvious importance and possesses a value which investigations at a distance could hardly be thought to have in comparison. The following are some of the instances which have been observed in this community:—

A well-marked case of poisoning occurred in 1863 in Boston, and was reported by Dr. W. E. Rice, The patient was a woman aged seventy-five years. After living a few days in a room which had been papered with a bright green paper, she was attacked with a burning sensation in the throat and stomach, with frequent, though slight, vomiting after taking food. She had diarrhœa with some dysenteric discharges. There was also great weakness, with trembling of the limbs and loss of appetite. Subsequently, severe cramps came on in the stomach and bowels; the skin was clammy; the voice was altered; pulse, 100; bowels constipated; abdomen very tender on pressure. There was violent retching and vomiting on taking small quantities of either liquid or solid food. All these symptoms were much aggravated after sweeping or dusting the room. Proper treatment alleviated the distress; but when the room was again dusted, the symptoms recurred with renewed violence. The residence of the patient was now changed, and recovery followed. The paper was found, on examination, to contain arsenite of copper in its pigment.†

The notes of the following case were communicated to the

* British and For. Med. Chir. Rev. Vol. XXIII., p. 519.

† Boston Med. and Surg. Journ., Vol. 69 (1863) p. 297.

writer by the individual who is the subject of the report: In the autumn of 1859, a middle-aged lady, the wife of an eminent citizen of Boston, commenced to occupy a room which had been freshly decorated with wall-paper whose pattern consisted of alternate stripes of gilt and green flock; of the poisonous character of the latter she was wholly unaware. Excepting a neuralgia from which she had long suffered, she considered her health at this time to be perfect. Soon after beginning to habitually sit in the apartment, she noticed a change in her feelings. The neuralgia, which previously had been only annoying, became intensified. She had headache and vertigo. There was nausea and distressing vomiting. The appetite was impaired, there was a dry cough and a bad taste in the mouth. Marked emaciation was manifest and an almost intolerable sense of prostration and exhaustion ensued. All these symptoms compelled her to keep the room the more continuously. Remedies were meanwhile applied unavailingly, since the cause of the ailment was not detected. In the following summer, a stay of several months in the country was attended with distinct relief; but a return to the town-residence was followed by a renewal of the painful experience, and during the winter months, while the room was occupied, the patient suffered distressingly. A second summer's absence brought a second season of respite, only to be followed by a third attack which renewedly baffled the skill of the attending physician. The symptoms at this period were of the most aggravated character. Frequent attacks of fainting, intense paroxysms of neuralgia, dizziness, almost incessant vomiting and great prostration reduced the patient to the last extremity, and her life was despaired of. At this time, when the sufferer was almost moribund, it occurred to herself that the possible cause of all her deplorable state was in the green paper of her room. A sample was at once analyzed by Dr. A. A. Hayes and was pronounced by him to be "loaded with arsenic and extremely unsafe." From this discovery was dated the beginning of the patient's recovery. The paper was removed as soon as possible, but so fully had the patient's system become charged with the poison and so depressing were its primary effects that the consequences of the renewed infection are experienced to this day.

The coloring matter of the paper had become so loosely

adherent that on passing the hand or a cloth lightly over its surface a distinct green stain was left. The workman who removed the paper from the walls was made seriously ill, although precautions were taken to prevent that accident; and it was ascertained also that the paper-hanger who had originally applied the paper was similarly poisoned.

The writer is indebted for the history of the following instance to Dr. John Jeffries of Boston, under whose observation it occurred: A married lady, in good health but feeling somewhat diminished vigor from attendance on her infant child, changed her residence. About two months after the change was made, her health became notably impaired without apparent cause. She suffered from dyspepsia, the attacks of which were increasingly severe; there was emaciation, lassitude, prostration and recurrent fainting. In the spring following a winter of this experience, the patient left the city, and during an absence of several months her health became fully restored. Another winter's residence at home brought a renewal of the former symptoms, with occasional headache and temporary paralysis of the limbs; the emaciation and prostration of strength were marked. A second summer's absence was attended with another remission in the condition of the patient, but the restoration was compromised by unusual anxiety in behalf of others. Her return to her residence developed all the former symptoms in an aggravated degree; with these, there were frequent and severe attacks of pain in the bowels, diarrhœa with occasional bloody evacuations (the latter coincident with an unusually prolonged stay in the house), cramps in the bowels and limbs, frequent loss of sensation and of the power of motion in the extremities and constantly progressive emaciation and debility. A change of residence was again advised and made. During the patient's absence the lead pipes in the house were removed and the copper tank was replaced, under the impression that some noxious influence, peculiar to the house, was constantly at work upon the patient's system. The lady returned recruited, after an absence of three weeks, but began at once to fail again. An accident compelled her to remain more constantly at home and finally to keep her room. It had been already suspected, and it was now definitely discov-

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ered that the green paper-hangings on the walls of the bedroom and of the sitting-room contained arsenic and that they were the source of all the trouble. The patient was at once removed to another house, and while the process of removing the arsenical paper was in progress, she constantly improved. After a month, the offending paper having all been disposed of, she returned to her home. Within a few days, she suffered from a sudden attack of diarrhœa, with smarting of the eyes and headache; it was discovered that on the day before this seizure she had dusted some books in one of the rooms before alluded to.

The wall-paper had a large floral pattern, with abundant foliage, well supplied with arsenical green. The patient feels some of the effects of the poison after an interval of nearly fifteen years.

The following case is characteristic. It was communicated to the writer by the physician in attendance:—

"Mrs A.'s illness was during four months of 1864. The first symptoms were those of catarrh of the nose and pharynx, with much pain and of an obstinate character, but not confining the patient to the house. Towards the end of April, she was in her chamber a good deal of the time, and she became much worse early in May. The symptoms chiefly complained of then were pain in the throat, difficulty of swallowing, diarrhœa, nausea, pain in the abdomen, and much prostration. The pulse was quick and weak, the appetite was gone and the patient seemed very ill. I had, from the first aggravation of the symptoms in the beginning of May, suspected the wall-paper of the chamber to be connected with the disease. It was a handsome paper, consisting of a dark green flock ground, covered with flowers. On mentioning my suspicion to the family I was told that all the wall-paper in the house had been examined by a skilful chemist who found that the parlor wall-paper contained a large amount of arsenic, but decided (from inspection only, as I afterwards learned) that there was no arsenic in the paper of the chamber. Of course the paper was removed from the walls of the parlor, but that of the chamber was allowed to remain.

"One day, while standing by the patient's bedside, being much puzzled by the obscurity of her symptoms, the idea of arsenic again occurred to me, and finding that I could easily rub off the green flock from the paper with my handkerchief, I secured a piece of the paper for examination. The test showed conclusively that the paper

contained a large amount of arsenic. The patient was removed to another room, and she began to amend from that time. In the course of a few weeks she was well."

Among other cases which have come to the writer's notice in the course of these investigations, the following are introduced as illustrative examples of the effects under consideration :—

A young lady of Boston occupied, during the winter of 1860–61, a room whose walls were decorated with a paper representing horse-chestnut leaves, in dark green and light green colors, the former being more abundant. It had been on the walls ten years, but the room, being a spare-room, had been but little occupied. Symptoms of a serious character, affecting the lungs, soon manifested themselves after the patient began to occupy the room. She suffered from cough, with great distress in respiration. Subsequently there was an eruption of a papular character, and the ankles were swollen. There was emaciation and great prostration. The friends of the patient despaired of her life. The diagnosis of the true nature of the disease was made by the late Dr. John Ware. The patient changed her residence and restoration of health at once began. There has never been any recurrence of the symptoms which originated in the arsenical room. The paper was analyzed by Dr. C. T. Jackson, and was found to be dangerously charged with arsenic.

A well-known physician of Boston has himself observed the poisonous effects of arseniferous wall-papers in his family and in his own person. He writes : " We were exposed for about five months to the action of the poisonous atmosphere before any deviation from health was experienced by either one of us. The symptoms first displayed themselves about the throat, interfering with deglutition and producing pretty severe salivation. We have ever since suffered from a great variety of symptoms which still cling to us in modified form and severity."

A gentleman, residing in Boston, occupied a room at night whose walls were covered with green paper. One child also, aged five years, slept in the same room. The father lost flesh and strength, suffered from dryness of the tongue, mouth and throat, and was bloated about the face. The child was debili-

tated, and restless at night, and suffered from pain in the side and a dry cough.

The paper on analysis was found charged with arsenic, and since its removal the symptoms have wholly disappeared.*

Cases like the foregoing might be multiplied almost indefinitely; but it is believed that those which have been cited will suffice to demonstrate the fact that very harmful effects may and do result from the employment of an agent whose poisonous character is well recognized and whose sole recommendation by those who offer it displayed on the paper-hangings which are designed to decorate our walls is that it produces an attractive color cheaply. These recorded instances exhibit a series of symptoms which, upon analysis, clearly show that the arsenical poisoning impresses itself on the human system locally as well as through its general influence. The local effects are precisely such as would be expected from the continued inhalation of an irritant agent, or from its presence in the atmosphere; the dryness of the throat and mouth, the inflammation of the mucous surface of the eye, the occasional salivation, the husky and altered voice, the severe frontal headache (about the frontal sinuses), the nausea and vomiting, the dry cough, all point to an action more or less marked and immediate on the various surfaces with which the poison comes in contact; while the more prolonged and insidious influence is indicated in the great debility and lassitude, the emaciation, the impaired nervous power, the irritability of disposition and depression of spirits, the muscular trembling, the occasional convulsions, the vertigo, the chilled extremities, the restless sleep, the pale, cachectic aspect, the digestive disturbances, and the neuralgia which comprise the general or constitutional symptoms. It is, of course, obvious that all these phenomena will not manifest themselves in the same individual as the results of exposure; nor will they present the uniformity which characterizes other modes of poisoning. Of those in any decree affected, probably the major-

* For farther cases, analogous to the foregoing, see the following: Taylor on Poisons, p. 434; Guy's Forensic Medicine, 3d Ed.; Fifth Report Med. Officer of Privy Council, 1862; Wiener Med. Wochensch., 1859, Nos. 43 and 44; Annales d'Hygiène, New Series, Vols. XII. and XIX.; Lancet, June 7, 1862; Boston Med. and Surg. Jour., Vol. 64; Lancet, Nov. 7, 1860; London Pharm. Jour., Vol. I., Sec. Ser.; Med. Times and Gazette, June 10, 1871; British Med. Jour., July 22, 1871.

ity would remark only the more primary and insignificant symptoms; for example, after a night's sleep in an apartment with the arsenical paper on its walls, the individual will notice a headache or a dryness of the mouth. It is only after prolonged exposure, or in persons specially susceptible, that the more serious effects are manifested. Thus, it is by a careful criticism of the various symptoms presented in a given case, and by observing the fact that in the presence of the assumed cause no other cause can be discovered sufficient to account for these various local and constitutional symptoms, that we are enabled to arrive at definite conclusions. There are no distinct and characteristic effects which will allow the observer at once to discriminate such a case, as salivation enables him to do in mercurial poisoning, or as the blue line of the gums and wrist-drop, in poisoning by lead. It is, indeed, this very obscurity and want of uniformity characterizing the effects of chronic arsenical poisoning from the cause in question, that has led many writers to question and not a few to deny the possibility of the dependence of such a condition on this exposure. It will doubtless also explain the fact that comparatively few of these instances are recognized in their true and independent relation and are reported as such; for it is plain that only the most unequivocal cases would be likely to see the light through the journals, and we are justified in inferring that a very great number of instances have occurred which from their anomalous character have escaped detection.

This feature is of evident importance, as affecting the public health. If cases were habitually occurring, presenting well-defined signs and readily traced to their cause, the community would entertain no doubt concerning the course to be followed, and arsenical paper-hangings would very quickly become unfashionable. But the individual instances, like some of those cited, are in many respects perplexing and obscure, readily eluding the tact of the physician in his attempts to determine their true character, and baffling him in the application of his remedies; hence there is a vantage ground for skepticism on the one hand and for ignorance on the other.

In this connection it may be observed that the symptoms due to poisoning by arsenical paper-hangings are, notwithstanding

the peculiarities above alluded to, strikingly similar to and, in many respects, absolutely identical with those of chronic arsenical poisoning when the agent, swallowed in small and frequently repeated doses, exerts its cumulative action. These latter symptoms are notoriously varied in character and present many apparent anomalies. They follow little regularity of manifestation. In different individuals they are exhibited sometimes with most emphasis in the digestive system, sometimes in the nervous system, and sometimes the influence is a general one and shows itself in a complication of symptoms. Thus it will be seen to be unnecessary to define a distinct train of phenomena as peculiar to poisoning by green wall-paper, since these offer no points of essential difference from those observed in ordinary chronic arsenical poisoning. The difference is one of degree and depends on the more or less prolonged and continuous exposure to small amounts of the poison introduced into the system slowly and by indirect channels.

Although the fact that serious and sometimes very alarming disease follows in certain cases the use of arsenical-green wall-paper is of more consequence to the community at large than any discussion of hypotheses concerning the method of infection, this latter question is not without interest. Various theories have been advanced to explain the processes by which the poisonous pigment enters the system, so as to produce its manifold pernicious effects. Gmelin, who first called attention to the subject in any of its relations, was of the opinion that the poison was absorbed as a volatile gas, the product of a "fermentation of the organic matters with which the arsenic is mixed." A little later, M. Louyet of Brussels declared that this gaseous exhalation was a special form of arseniuretted hydrogen, and based his theory on the observation that when a mixture of arsenic and distilled water is allowed to stand a few days, the water at the end of that time gives out a distinct odor of garlic, which, as is well known, is characteristic of arsenic; and this evolution he thinks due to a decomposition of the water in the presence of arsenic. Analogously, the moisture which is almost always present in the walls of rooms undergoes a similar decomposition, evolving a volatile and very poisonous product. This view he thought strengthened by the

presence of the alliaceous odor in rooms papered with the arsenical hangings. Basedow, a Prussian chemist of distinction, published similar opinions, the source of danger being attributed by him to the development, under the influence of moisture, of a certain amount of arseniuretted hydrogen. Other observers have adopted similar views, advocating the theory of gaseous decomposition, either from the presence of moisture,* or from slow combustion ("eremacaucis") of the organic elements contained in the paper or in its pigment,† or from the presence in the room of illuminating gas which escapes in small amount and reacts on the arsenite of copper to produce arseniuretted hydrogen.‡

All these theories of the evolution of a poisonous gas are to be distinguished from the absolutely untenable notion which was at one time accepted popularly, namely, that the poisoning took place by the inhalation of volatile arsenical fumes which escaped from the paper. This idea is obviously fallacious, since arsenic is volatilized and evolves "fumes" at a temperature of 360° Fahr., 150° above the boiling point of water.

These hypotheses are not accepted by the majority of chemists at the present day. It is the general belief that the poison escapes from the paper into the atmosphere in the form of dust, mechanically disengaged. This view seems not unreasonable in consideration of the composition of the paper and of the methods employed to engage the pigment in position. The connection between the paper and its color, at the beginning depending only on the adhesiveness of size, certainly does not grow stronger with age. The paper is applied to the wall when moist with the paste or glue of the paper-hanger, and the size surrenders in this process something of its adhesive property. Varying states of the atmosphere, as they regard moisture and dryness, still farther carry on the change by which, with alternate drying and wetting, the pigment is less and less securely held. So that any mechanical violence, however small,—the action of drafts of air, or the passing of a duster, or vibration,—serves to disengage an impalpable powder containing the poisonous agent. It is well known that in the most unused room the air contains a certain amount of dust, so that a single sunbeam let into such a room when it is darkened reveals a perfect

* Otto Mohr. † John Taylor. ‡ C. T. Jackson,

cloud of flying particles whose origin no one can tell. It is easy to see how the loosely adherent arsenical powder on the wall-paper of such a room may constitute a part of this dust and the atmosphere become charged in greater or less degree with the pernicious agent. One element in the vexed problem of the relation of dust and disease thus finds solution.

This view has receives confirmation in the fact that the dust resting on the furniture and mantels of such rooms has been tested and has been found to contain the arsenic in considerable amount. Such an experiment is reported by Prof. Taylor as follows:—

"A friend whose library walls were covered with an arsenical-green paper had suffered for some time from chronic inflammation of the eyes, especially affecting the conjunctivæ of the eye-lids. On the discovery that arsenic was contained in the green pigment of this paper in rather large amount, he caused it to be removed during the summer and replaced by another containing no arsenic. The inflammation from which he had suffered disappeared, but late in the autumn following it returned. He informed me that he had been dusting some books in a book-case belonging to this room, and he imagined that the dust which had accumulated for two or three years had affected his eyes and had caused a return of the inflammation. Some of the dust was carefully removed from the tops of a few books by a feather and submitted to chemical analysis. The dust weighed one grain and a half; it had an olive-green color and under the microscope it presented the appearance of fibres, with numerous particles of various colors, chiefly of a grayish-black. A portion of the dust yielded a deposit of arsenic by Reinsch's test and there was, therefore, clear evidence that some of the mineral arsenical pigment, formerly on the walls, had found its way through the glass doors of the book-case and had been deposited in the form of fine dust on the tops of the books."*

Prof. Taylor carried his researches still farther in this direction, and tested other dust, collected in a similar manner in the closed cases of a room papered with unglazed arsenical paper, and obtained essentially the same results. These instances, taken in connection with that of Dr. Hinds, cited above, appear to demonstrate that the poisonous pigment escapes from the paper into the atmosphere, and is inspired in substance by the occupants of the room thus contaminated. The poison thus

* Med. Times and Gazette, Jan. 1, 1859.

inhaled enters the system through the lungs, or, by local action, produces the symptoms before described.

A third class of observers, including M. Kirchgässer of Coblentz and M. Chevallier, accept both these theories and allow a dual toxical influence. They admit all that is claimed for the dust hypothesis, but believe also, in view of the occasional detection of the odor of garlic or of mustiness in the suspected rooms, that under certain conditions of moisture a gas is generated, poisonous in character, which escapes to infect the air.

Who are the victims of the unnecessary, yet too common, practice of covering the walls of rooms with poisonous paper? It is obvious that everybody exposed to the influence in question is not affected, even to a moderate degree. No positive criterion can be established, indeed, since the conditions of exposure are so varied and complicated. It cannot be said of a sample of wall-paper with a stated amount of arsenic on its surface, that when laid on the wall of a room it will produce a regular series of symptoms in the persons occupying the room a given length of time. Other things being equal, the persons whom habit or occupation keeps much within doors would be most likely to suffer, and we should look for most numerous cases among women and young children. But, in point of fact, we find a great diversity of susceptibility. Among those who are even exposed continuously to the action of the poison, there occur instances of immunity. Such a case is cited by Dr. Guy:—

"I have myself known an instance of a spacious day and night nursery opening into each other and covered with a flowered paper rich in emerald green, occupied for several months together by nurses and children, and yet without, in any way, affecting the health of the inmates. The poison in this case was so loosely laid on that it deeply stained a white handkerchief rubbed over it. This case is the more striking as it occurred in the house of a physician well acquainted with the effects of the poison and quite alive to their detection." *

But these negative cases are important only as showing the tolerance of a poison by the human system, and they do not

* Report of Med. Officer, Privy Council, *loco citato*, p. 135.

annul the force of such testimony as has been quoted. It is a fact well recognized by physicians that different organisms vary exceedingly in their susceptibility to the action of drugs, and this idiosyncrasy will explain much of the diversity of effects observed in connection with the mode of chronic arsenical poisoning we are studying. An agent which is comparatively inert as regards one organism is to another an active poison. But because, for example, the poisonous ivy is to some persons harmless, or because certain people in Styria can swallow pure arsenic and appear to thrive upon it, there will yet be few of us who, knowing the possible results to ourselves in the one case or the other, would be quite willing to purposely test our own powers of tolerance. It is hardly justifiable, therefore, to put children to sleep in an atmosphere charged even slightly with arsenic, voluntarily trusting to the chances that such an exposure will be harmless.

When to this consideration of susceptibility are added other conditions, such as the previous health of persons, the degree of exposure (depending, primarily, on the amount and tenacity of the arsenic in the paper and indirectly on attention to ventilation), or the eliminating power of the system, it will be seen how many circumstances influence the effect of the poison. Few will be found who, with any knowledge of the facts, will insist that a mineral agent which is capable, almost invariably, of producing well-recognized effects when taken into the stomach, is as invariably incapable of harm when it is more indirectly absorbed by the system through the mucous membrane of the respiratory organs; and few will be ready to take on themselves the voluntary risk of testing the question in their own persons by habitually dwelling in arsenical rooms, or will think it advisable that any human being should breathe the poisoned air of such rooms, even admitting that a portion of mankind is, in this respect, arsenic-proof.

The idea readily suggests itself that if such effects as those described are to be observed in the occupants of rooms, decorated with green paper, we ought certainly to discover some influence on the health of workmen who are exposed to the action of the arsenical pigments in the practice of their trades; and we should look for positive testimony from those engaged in the manufacture of the paper-hangings and from those who put

the papers on the walls of rooms. And evidence of this kind is not wanting. The investigations of Chevallier, of Pietra-Santa, of Dr. Guy and others show that a distinctive train of symptoms appears in those habitually engaged in making arsenical papers, and that these symptoms are referable to the arsenic in the pigment. According to these authorities, they are not unlike those already enumerated as observable in the occupants of arsenical rooms; they consist of thirst, nausea and vomiting, pain in the stomach and bowels, great prostration, disturbances of digestion, drowsiness, headache, nervous tremblings, and (traceable more directly to the local action of the arsenic) sore-throat and irritation of the mucous membrane of the nose and mouth, showing itself in sneezing, a mucous or bloody discharge and swelling of the lips. Coincident with these is the appearance sometimes of various eruptions on exposed parts of the body, as the hands and face. These eruptions are sometimes mere pimples, sometimes they resemble erysipelas (erythematous), and sometimes they develop to ulcerations whose favorite seat is in the folds of the fingers and about the roots of the nails, where the pigment would be most likely to make a more or less permanent lodgment. These symptoms manifest themselves with a severity and uniformity in proportion to the degree, length and continuity of exposure, to the workman's neglect of cleanliness, and to individual susceptibility to the poison; and they disappear spontaneously when the work in green colors is discontinued.

The personal researches of the writer verify many of these observations. A visit was made, in August, 1871, to one of the largest manufactories of wall-paper in New England, and facilities were afforded to witness all the processes. Workmen were seen engaged in making the colors, in mixing them with size preparatory to printing, in laying on the ground-pigment and in printing in colors. The building was not inferior to others of its class, and ample provision appeared to have been made for light and ventilation. In making the green pigment, arsenic was used by the barrel. A number of the workmen were asked whether they had observed any effects from their exposure to the pigments which they used. Their replies showed that, either from their own personal experience or by common consent, the emerald-green colors had a bad name; and in a

few instances arsenic was mentioned as the recognized agent which caused the harm. A foreman in the color-room, where the pigments were mixed with warm size, stated that putting the hands and forearms into the green color, as was the frequent practice in order to hasten the process of mixing, produced in a short time "sores on the hands"; and that the workmen, recognizing this, changed work frequently. Another, a workman, said he had had the ulcers, but he thought they might be avoided by careful attention to washing; he considered that there was little danger, however, if the skin of the hands was unbroken, the color acting much more quickly on cuts or abrasions. One man, aged about fifty years, who at the time of the visit was at work in the "bronzing room," stated that he had been employed in the business twenty-three years, and had been engaged in various departments. He had himself suffered from the ill effects of emerald green and had observed them in others. He considered the pigment a poison and that its influence was worse when it was used dry. After working with the color a fortnight or less, the symptoms generally manifested themselves, commencing like the onset of a bad cold in the head: there was headache and a foul discharge from the nose; the lips and nose swelled; there was salivation "as bad as from mercury," nausea and a feeling of illness in general. At the same time the genitals were swollen so that walking was attended with difficulty. Ulcers, also, appeared on the hands. These symptoms gradually disappeared within a fortnight after the work was discontinued.

Many paper-hangers, likewise, recognize the fact that certain green papers have a tendency to develop a peculiar set of symptoms in those engaged in fitting and hanging the paper on the walls of dwellings. These symptoms are of an acute character, manifesting themselves without delay and giving evidence of a local effect. They resemble in many respects those which characterize the beginning of an ordinary "cold in the head," and consist of sneezing, irritation of the eyes and nostrils, headache, and swelling of the lips; in the more severe forms of poisoning, there is vomiting with diarrhœa and an indescribable feeling of illness. Many cases of this kind have been reported from time to time, and some instances are recorded in which the paper-hangers have asserted that they never could work

upon certain green papers without being made seriously ill. In the course of this investigation, the writer has obtained information from paper-hangers which in many respects corroborated the observations recorded. Of nine of these men who were seen, seven had been poisoned by the arsenical wall-paper with various degrees of severity; the two negative cases were those of men who had not been long engaged in the business. Of the seven instances, one was especially marked. Within twelve hours after working upon a paper whose pigment was loosely laid on, the symptoms of poisoning showed themselves; there was irritation of the mucous membrane of the eyes, nose and mouth accompanied with great prostration of strength; presently, an eczematous eruption appeared on the hands and extended to other parts of the body. The illness was so severe as to necessitate entire suspension of his work, and he entered the hospital for treatment.

In the other cases, the symptoms were less serious, but they were sufficiently characteristic. Immediately consequent upon the work with the emerald-green papers, and disappearing within a week after the exposure ceased, the effects before described were experienced,—inflammation of the eyes (conjunctivitis), swelling of the nose with a mucous discharge, ulcerations about the nostrils, headache, sore lips and sometimes bleeding from the nose.

The following instance has incidentally come to the writer's notice. Mr. W., a young man of robust constitution, a salesman in a paper-hangings store, complained of nausea, diarrhœa, great lassitude, inflammation of the conjunctiva, mucous discharge from the nose, and occasional dizziness. The symptoms could be explained by no unusual excess or exposure, and nothing was elicited to which his condition could be attributed save the fact that during the month previous he had exhibited to customers more patterns of arsenical-green paper than usual.

To these statements concerning the ill effects experienced by workmen, exception will be taken by some and especially by those interested in the manufacture and sale of paper-hangings, on the ground that none of the alleged injuries have occurred under their observation. It may readily be seen that, notwithstanding its apparent partiality, such negative testimony might be given in all sincerity. The symptoms described are such as

would naturally be referred to other causes; they are, in a measure, obscure; they occur with exceptional severity and they do not terminate fatally; they do not generally interfere with the performance of duty, and a workman would not be likely to complain of a condition of things of whose real character he had no certain knowledge, especially when he was dependent on his occupation for a livelihood.

This study of the employment of the arsenical-green pigments in various arts and of the manifold noxious effects which directly or indirectly result suggests, in conclusion, the consideration of some remedy for what we must term an evil. There will, of course, be those who will hesitate to condemn this use of arsenic and who will hardly be ready to denominate it an evil. To those, for example, who regard fatality, the aggregate number of deaths, as the test by which the fruits of an alleged abuse are to be relatively judged, this whole inquiry will appear unnecessary, perhaps unjustifiable.

Not so do those reason who have themselves observed the ill consequences of too great trust in color, or who have experienced those effects in their own persons. Those who realize that seriously impaired health does, in a certain number of cases, surely result from the employment of an active poison in the composition of a color whose sole purpose is as a luxury to gratify the sense of vision and which has not the smallest claim as a necessity, feel that an emphatic word of warning is imperative. It is to be remembered that the arsenical colors are poisons scarcely less active than the agent which gives them their name; and being colors simply, a single unequivocal instance of injury justifies their condemnation without the need of waiting until people are habitually killed by them.

Many suggestions have been made with the view to the protection of people from the harmful effects resulting from the arsenical greens. For example, the green wall-papers are to be covered with a layer of varnish; the workmen are to be specially instructed with regard to cleanliness; and so on. At best, these are but compromises and a partial remedy; and were it carried out as fully as practicable there would still be abundant exposure. If the use of arsenic in the relations we have studied is an evil, it is an absolute evil, concerning which the public

may well be informed, for "the people perish for lack of knowledge" of the risks to which they unconsciously expose themselves in the means they take to gratify a refined taste for the beautiful.

It is questionable whether in our own community such a knowledge is not itself the best remedy that can be suggested. In other countries, in which the machinery of government is capable of rigidly executing the laws which are enacted in behalf of the public welfare, legislative restrictions are practicable; and Germany, France and Sweden have stringently regulated the traffic in the arsenical colors. Such repressive legislation would be difficult in a society and under a government organized like our own. The rights of individuals and of industrial pursuits are deemed too sacred to allow of excessive restriction, and a prohibitory law to affect the manufacture or use of arsenical pigments would be of questionable force.

If, however, there can be awakened in the community some appreciation of the dangers which belong to the indiscriminate use of emerald-green colors, there will be no need to invent methods of repression in behalf of the public health; for reasonable people, informed concerning the risks, will not be likely to test their own tolerance of arsenic or to subject their children to it. The demand ceasing, the supply will cease; and a correct taste in color will find its gratification in agents which possess no poisonous character.

L-DAMS AND OTHER WATER OBSTRUCTIONS.

By THE SECRETARY.

up various manufactures,
economy of the power
a factory-town,—perhaps
the dam is soon raised, and
water, tumbling over the fall
ner days, we find a great reser-
easons of drought. The charac-
n obstructions may thus be greatly
o be flat and level, the inhabitants
s converted into swamps, their dry
p and spongy and half-drowned lands,
ie the health of their occupants and kill
rees. This conversion of dry soil into one
ently wet, while it may afford profit to the
m, may at the same time cause the gradual
f consumption in hundreds of families.

oir itself is a still more frequent cause of ill-health
lers on its banks. In addition to the soil moisture
ccasions, it is very sure to receive the wash and the
many people, and a far greater amount of putrescent
than can be disposed of in water whose flow is obstructed.
novement which is needful for the work of purification
g prevented, the result is seen in a pool whose rank vege-
e growths indicate the half-hidden impurities on which they
nourished.

n the summer, when free motion of the stream is most
led to rid it of the sewage which it receives from the neigh-
ng inhabitants, it is only drawn upon for mill-power, and
this object every available drop is saved. When in the
on of drought and heat the mill-power is at its minimum
the fever-power at its maximum, the reservoir is often
rely emptied and the whole bottom exposed to the influence
he sun's rays. It then becomes evident from the faint and
usting odor of decaying vegetation, mingled with whatever
uman refuse has been added, what dangerous stuff has been
red in the half stagnant water. Our correspondence of
year showed in how many instances this exposure of reser-
s has preceded an outbreak of typhoid fever.

uch places in our Southern country would be looked upon
kely to give rise to malarious fevers, to intermittents and

remittents. In New England they seem associated with typhoid and, as was stated in our report of last year, through influences coming, like those producing periodic fevers, from the earth itself.

We may even find the two forms of fever so mingled as to make the practitioner doubtful with which he has to contend. There is now a debatable ground in the Middle States and in the northern range of Southern States, where a form of fever exists which during the war of the rebellion was known to our Medical Department and officially reported as "typho-malarial," having more or less of the character of both the enteric and periodic affections.

There is reason to believe that the territorial line of division (always ill-defined) between fevers of a continued and of a periodic type is extending northward, and that our immunity from remittents and intermittents is far less complete than in previous generations. Thirty-four years ago Dr. Oliver Wendell Holmes instituted an inquiry among the most experienced physicians of the time in New England, with the purpose of learning what they themselves knew and whatever had come down from their predecessors concerning intermittent fever originating within the field of their practice. The materials thus collected were made the basis of an essay of singular interest, which was published in 1838 as a Boylston Prize Dissertation. It appeared from all the evidence collected by Dr. Holmes that the traces of indigenous intermittents in Massachusetts were, except in a very few places, but scanty. Some cases had been observed within the memory of living men in the Connecticut Valley, at Northampton, Hatfield and Deerfield. Tradition made it probable that soon after the first settlement of that region they were less infrequent. At Groton and Hopkinton and a few other scattered towns, fever and ague had been known to originate during the previous half century. In the valley of the Housatonic, and there alone in Massachusetts, were found distinct records of intermittent fever as a prevailing disease. In Sheffield it had been always known, not only on the banks of the river, but in the vicinity of certain ponds. Some of the letters in which the history of intermittent fever in Southern Berkshire is given speak of the apparent exciting causes as follows: "Mill-dams on the Housatonic and

its tributaries, by forcing the water for miles above their location into low grounds, marshes and coves, and thereby producing macerating reservoirs of vegetable substances, cause *foci* of pestiferous exhalations to which intermittents in all their grades and varieties have been obviously traceable." Several instances are mentioned in which dams were built for the purpose of killing the timber by flooding it, during the early settlement of the country, and that purpose was accomplished, but with the additional effect of killing a certain number of people also by fevers.

About the year 1828 a dam was built for obtaining water-power for mechanical purposes on the Housatonic, two or three miles south of the Massachusetts line. It affected the height of water on that sluggish stream for a distance of ten miles, and was followed by such increase of intermittent fever that the people sought and obtained legal authority for the removal of the dam on the ground that its effects on public health were such as to constitute it a public nuisance.

Twenty-five years ago it was taught in our medical schools that intermittent fever was a disease almost unknown in Massachusetts, except when contracted in other places. The opinion of Dr. Nathan Smith concerning the complete immunity from this disease of the Connecticut Valley, in Vermont and New Hampshire, was accepted as the rule for all New England. That there were exceptions was admitted, but they were of great rarity.

The exemption of the people of this State from periodic fevers seems to be far less complete at the present time. Intermittents have been observed in Chelsea, and the history of the cases carefully investigated, and their local origin proved on lands reclaimed from a salt marsh and now covered with houses. Cases have been seen during the past year clearly originating in Boston. They have been reported of late years in various parts of the State, along the banks of streams, in lowlands and also in the immediate vicinity of tide-water, and occurring in persons who had never lived elsewhere. Physicians have also observed that in the treatment of typhoid or enteric fever, the number of cases in which quinine is found useful, not simply as a tonic but as a febrifuge, has become very considerable. In parts of Connecticut, intermittent and even re-

mittent fevers are now not only frequent but severe, and the gradual enlargement of the area of malarious influence from the latitude of Long Island Sound towards the southern border of Massachusetts is a fact to which we may well give heed. In reply to inquiries on this subject, the following information has been received from Dr E. W. Blake of New Haven, who kindly allows us to publish it :—

"*Periodic Fevers in and about New Haven, Conn.*"

"First, a few words as to the topography of New Haven and its vicinity. The city is situated on a level plain, at the head of a harbor, which extends four or five miles from Long Island Sound. The harbor is formed by the confluence of three rivers,—the Quinnepiac, which bounds the city on the east, Mill River, which flows through its eastern section, and West River, which forms a part of its western boundary. Except towards the Sound, hills encompass it, two of which, East and West Rocks, present precipitous fronts of trap, 370 and 400 feet high. The soil is generally gravelly.

"The Quinnepiac flows through extensive meadows, on whose borders at North Haven are extensive clay pits, where are annually made some 30,000,000 bricks. Higher up are Wallingford, Quinnepiac and Meriden.

"Mill River skirts East Rock, flowing through Whitneyville, two miles from New Haven, where it is dammed, forming Whitney Lake, which extends two and a half miles and covers an area of 252 acres. This lake affords the city's water supply. On the river beyond the lake are situated Augurville, Centreville, Ives' Station and Mount Carmel; these places, as likewise Whitneyville and the lake, are within the corporate limits of the town of Hamden.

"West River flows through Westville, a village in the town of New Haven, skirting West Rock, and with its connecting streams and tributary ponds affords sites for various factories.

"In the outskirts of New Haven, are many 'hollows' where water *stands* during wet seasons, making permanent ponds, and others where a slow drying process goes on after every heavy rain.

"Beaver Pond is a peat swamp, commencing in the north-western part of the city, and stretching some two miles into the adjoining town of Hamden. Some sluggish streams run through it, and it contains many stagnant pools.

"Periodic fevers have been occasionally prevalent in New Haven and its vicinity, ever since its first settlement in 1638–39.

"There were a score or two of cases of intermittent fever in New Haven and its immediate neighborhood in the six or seven

years which followed 1850; none during the preceding forty years.

"The present epidemic of this disease in the 'New Haven region' first appeared in the summer of 1863. One case in West Haven, some four miles south-west of the city, and two cases on and near Mill River, three miles north of the city. The case in West Haven occurred in a person who lived close to a mill-pond which had been drawn off for repairs. It has prevailed in that locality ever since, spreading more widely each successive year. On Mill River, ten years ago, a dam was rebuilt and greatly raised, and a lake formed (which before was a mill-pond) for supplying the city with water. A large tract of land was flowed, which in dry seasons is laid bare to a large extent. At the head of the lake, close to its edge, occurred the first case of fever in that quarter and that year. The other case was that of a man who resided on high ground, three-quarters of a mile east of the lake. Since then, the disease has returned every season to the present time, being most general in the years 1869, 1870 and 1871. It has been for five or six years generally prevalent at Whitneyville, which lies below and near the dam. In 1867 the fever appeared higher up the river at Augurville, Centreville, Ives' Station and Mount Carmel, all manufacturing villages, with mill-ponds near by, the last-mentioned place being eight or ten miles from the city.

"In 1865, the disease appeared around Beaver Pond, so called, a peat swamp extending two miles north-west from the city. The same year it showed itself on West River at Westville, situated under West Rock, where there are several mill-ponds and factories. From these points it extended into Hamden and the north-west part of the city, in which places it is still prevalent.

"In North Haven, on the Quinnepiac, seven miles north-east of the city, the fever appeared in 1867 on the west side of the river. It was more general in 1868, and still more so in 1869, 1870 and 1871; in the two last years prevailing all over the town and extending up the river to the manufacturing village of Quinnepiac, and finally, during the present year, to Wallingford, twelve miles from New Haven. In Meriden, still higher up on the same river, the disease appeared some two or three years ago and is still rife. It is also prevalent in Cheshire and Southington, the towns lying west of Wallingford and Meriden.

"The city has suffered along its northern, north-eastern, north-western and western borders, more last year than before, and more this year than last. There are a few cases this year in the central parts of the city. It should perhaps be stated here that in many

of the streets, the soil has been much disturbed for making road-beds for McAdam pavements, and by deeper excavations for constructing sewers. East Haven, lying on the east side of the harbor and Quinnepiac River, has not escaped, though it has suffered less than any other town near New Haven. With the exception of this fever, the New Haven region is healthy.

"The seasons of 1864–5 were dry; those of 1866, 1867 and 1868 were wet; those of 1869 and 1870, particularly the latter, very dry; the present year has been moderately wet."

Dr. Blake also furnishes the following estimates of the number of cases which have occurred in the past eight years:—

CITIES AND TOWNS.	Population.	Cases of various forms periodic fever.
New Haven,	50,000	1,500
Hamden,	3,500	3,000
Westville,	1,500	1,200
North Haven,	1,800	1,000
Cheshire,	2,500	*
Wallingford,	3,500	*
Southington,	4,300	*
Meriden,	10,500	*
Orange (W. Haven),	2,800	*

"The cases have been of every form and type 'regular, irregular and defective'; the latter covering cases of 'dumb ague' which are very common in the older fever and ague localities. Cases of remittent have also been quite numerous. In many localities whole families have been prostrated with the various forms of this malarious disease; old and young have alike suffered. There have been instances of the closing of factories by their proprietors from this cause."

If, as seems probable from what has been stated, fevers of a periodic type, intermittent and remittent, show a disposition to extend from more southern regions and invade New England, it must be definitely stated that the cause is unknown. Such changes in the territorial limits of diseases of this class are of not infrequent record in history. They prevail for a certain period, pass away, and again return, seemingly in obedience to

* Of the number of cases in these places there is no reliable information.

some law of wide-spread operation as yet not comprehended.* But if we cannot control the predisposition, if we cannot avert the proclivity to disease in certain forms, which at times seems to exist in great sections of country, observation has pointed out very plainly the special and local circumstances which encourage their development and increase their severity. We know that, in our Southern States, periodic fevers are most frequent and violent on the low lying and wet rice-plantations, and by the side of sluggish streams with a rich vegetation. If the cycle of malarious influence should again come round, if intermittents and remittents should prevail in Masssachusetts as they now do in Connecticut, they need not be looked for on the dry pine-plains, or on the hill-sides, but will surely be found by the sluggish water-courses, in the salt-water marshes, by the side of obstructed streams and reservoirs, and wherever the natural flow of water is so hindered by man's contrivances that the result is stagnation.

But there is another form of water obstruction, which, from special circumstances, is full of danger to the public health, and is counterbalanced by no commensurate claims to economical value. If the fresh-water obstructions need to be watched, some of the salt-water obstructions need to be demolished. If the river dams and reservoirs are liable when used for the single object of profit, to render public health less secure, the tide-mills *in crowded neighborhoods* are nuisances which should be abated.

The rise-and-fall of the tide has been used as a motive power from the earliest settlement of the country. Before the age of steam, it was made available in nearly every town on our coast, where an arm of the sea was sufficiently narrow to allow of the ready construction of a dam. In some instances, very elaborate and expensive works were undertaken, with permanently full and empty basins, so that the power should be continuous. Tide mills have not been found profitable, and but few have been built of late years, but the dams remain, and the water-power is still used to a certain extent. It happens, in many instances, that large cities and towns have grown up immedi-

* From the diary of a tutor in Harvard College, in 1683, it would appear that intermittent fever was recognized at that time as occurring in Cambridge and in Salem. See Boston Medical and Surgical Journal, January 26th, 1853.

ately around them, and where nobody lived when the water obstruction was first permitted may now be found a crowded population, absolutely requiring, for the maintenance of health, all the fresh air and all the drainage which it is possible to supply under circumstances the most favorable.

A striking instance of this form of nuisance, and on an enormous scale, may be seen in the present condition of what was once the receiving basin of the Boston and Roxbury Mill-Dam Corporation, now in process of filling for the streets and houses of the most fashionable part of Boston. This has become a "dead sea" of uncleanness, by reason of the obstruction to the free wash of the tide which is offered by the "Cross Dam." During the summer of 1871 a territory of about seventy acres was thus kept nearly filled with stagnant salt water, the daily ebb and flow being almost entirely prevented for the sake of the power which was thus given to a grist-mill. It has been sometimes said that this half-stagnant water was retained in the basin to prevent the emanations from the mud along its borders at low tide. The answer to such defence is seen by comparison of the two basins from the Cross Dam. In one the tide ebbs and flows freely at all seasons, and there is no offensive odor, although the great Stony Brook sewer empties into it; in the other, the tide is obstructed, and the odor is vile, although it now receives no sewage from any city drain. The wash of the tide during the present winter would probably have rendered occasional exposure of the flats next summer quite inoffensive. There were times during the month of July last when the sickening odor coming from this region was sufficient to drive people from their houses. It certainly affected the health and comfort of at least twenty thousand people, and it is certain to do so again in the coming summer, unless the stagnant condition of the water is relieved. Each year, as the water area is diminished by filling, it will become more offensive from the accumulation of mud impregnated with old sewage being thrust inward as the gravel is unloaded along its border.

Salem has on either side an arm of the sea known as North and South Rivers. Both have been obstructed by dams for a very long period, and both are now nuisances which deprive the neighboring inhabitants of the fresh air which they have an unquestionable right to enjoy, and which public authority

should secure to every citizen. Above Frye's Mills, on the North River, the mill-pond is polluted by the drainage from a good many tanneries, and from a thickly settled portion of the town of Peabody. Here is seen on a large scale the kind of fouling to which salt-water mill-ponds are almost certainly exposed in the neighborhood of large towns. The temptation, both on the part of individuals and corporate authorities, to cast into the pool the refuse fluids and solids which must be got rid of, is too strong to be resisted; and the result is, that the mud in the course of time becomes completely charged with a putrid sediment which contaminates the water, and in hot weather gives off the most offensive odors. The accumulation goes on from year to year, unobserved in winter, but each summer growing more offensive. There can be no doubt that the power of resisting disease of every kind is diminished by habitually breathing air so polluted, that not only the enjoyment but the duration of life is abridged, and that the liability to destructive epidemics is thereby increased.

The remedy in this extreme case of water made putrid above Frye's Mills in Salem and Peabody by both dam obstruction and abundant sewage would not probably be complete by permitting the tide to freely ebb and flow, The constant fouling from the beam-houses is on too great a scale.

The drainage from Peabody must almost necessarily seek this natural basin on its way to the sea, and it seems inevitable that sooner or later the flats should be filled, the dam removed, and a capacious sewer built which may receive the waters of Tapley's and Proctor's brooks, and the liquid waste of the tanneries and of the people on both sides of North River. And the sooner the authorities of Salem and Peabody unite for the accomplishment of this improvement, the better will it be for public health.

Charlestown has an old mill-dam and tide-obstructed basin which also receives a good deal of sewage and is a nuisance without qualification. Passengers on the Eastern, the Boston & Maine and Fitchburg railroads are familiar with its odor as they pass its borders; but the people of Charlestown Neck are almost constantly exposed to its influence in summer by the prevailing winds of that season, and suffer from its effects. The Charlestown health authorities are endeavoring to arrange for

the filling up of this basin, but if they would meanwhile allow the tide free access, summer and winter, it would tend to its purification and greatly diminish the present evil.

At Danvers Port is a similar dam hindering the wash of the tide and so confining the impurities thrown into the basin by the Danvers Gas Works that during the last summer it caused the death (apparently) of every fish, both big and little, and the resulting odor was a subject of just complaint by the residents in its vicinity.

Miller's River, an arm of the sea between East Cambridge and Somerville, is another enormous nuisance in its present condition, rendered so by obstructions to the natural flow of the tide and by the drainage of a low-lying and densely-populated region on its banks. There are also slaughtering establishments where several hundred thousand hogs are annually killed, and their only drainage is into this obstructed pool. Blood and other animal matter may be seen, and in hot weather smelled, all along the banks of Miller's River, and it taints the air which is breathed by thousands. The Boards of Health of Cambridge and Somerville during the past summer presented a petition to the State Board of Health asking their action under the law of 1871, chapter 167, General Statutes, with reference to these slaughter houses; but at the time appointed for a hearing, the complaint was withdrawn.

The great and pressing want in the case of these hog-slaughter houses is *drainage*, and this they could have by the filling up the flats of Miller's River, and the construction of a sewer through the whole length of the basin. The need of this improvement is urgent, and it is greatly to be desired in the interests of health that the cities of Cambridge and Somerville should undertake it without the delay of another year. Meanwhile the obstructions to the flow of the tide do only harm, and render the mud more and more foul.*

All along our coast may be found old mill-dams which are liable to become as objectionable as those we have described. Whenever population crowds upon the banks of the ponds they enclose, they soon become downright nuisances, and should be so regarded by the boards of health of cities and towns.

* Some of these obstructions have been recently removed by the local health authorities.

ANALYSIS OF THE CORRESPONDENCE

ON THE

Use and Abuse of Intoxicating Drinks throughout the Globe,

WHICH WAS PRESENTED TO THE LEGISLATURE IN 1871:

OR,

INTEMPERANCE AS SEEN IN THE LIGHT OF COSMIC LAW.

BY THE CHAIRMAN.

ANALYSIS OF THE CORRESPONDENCE.

OCTOBER 15, 1871.

To the Members of the Massachusetts State Board of Health.

GENTLEMEN :—In our Second Annual Report is printed a correspondence on the use and abuse of alcoholic stimulants among foreign nations, and a comparison of the same with our own country in this particular. I think this correspondence is unique not only for the extent of the surface of the globe that it embraces, but likewise for the character of our correspondents. Last year, owing to want of time, the letters were printed without comment, except a most imperfect analysis of them.

I have thought that they should receive more attention from us, and that all their essential truths or apparent truths should be sifted out and brought more clearly into view. I have had this end in view while preparing this communication for you.

I cannot perhaps hope to gain the unanimous consent of the Board to all the propositions I may feel justified in laying down after a fair consideration of the various letters. But I trust you will believe that I have endeavored to get at the exact truth.

In commencing the correspondence as your representative I had no other object in view than to get the opinions of able correspondents, most of them either American ambassadors to different courts or consuls from the American government stationed in all the various important countries of the world to which our commerce extends. My questions embraced two main ideas. They were put briefly, because I believed that if I asked a few questions containing seminal principles, I should get ampler responses than if I should ask a greater number, which would necessarily require a longer time and perhaps much study to answer correctly.

The two ideas were, First: to learn the nature and character of the stimulants used (if any were so used) by the inhabitants of countries to which said correspondents were accredited, and the influence of such indulgence on the health and prosperity of the people.

Second: the relative amount of intoxication in said countries compared with that known by such correspondents to exist in the United States.

The papers were sent to thirty-three resident American ambassadors and one hundred and thirty-two consuls and a few other non-official personages and friends whose opinions I knew would be of great value if obtained.

Among these correspondents are many of our most distinguished citizens, some of whom are well known for their eminent intellectual and moral qualities. Usually they have resided for some years in the places from which they write, and are of course generally well acquainted with the habits of the people, not only of the cities from which they reply, but also with those of the people of the districts or countries in which these cities are situated. Most of them write as if they knew well the habits of the people, and also those of our own nation in reference to the use and abuse of stimulating drink. Hence their opinions on that subject are of great value.

Extent of our Correspondence on the Use and Abuse of Stimulants. Cosmic View indicated.

The correspondence virtually embraces the civilized parts of the globe. The letters came from forty-nine different places, *i. e.* from a little more than one-fourth of those to whom the circular was sent, which with three from this country, made fifty-two different "observation stations," so to speak. I admit that this number is too small to allow us to lay down perfectly positive laws in regard to the topics suggested. But while admitting this much, we may, I think, with equal certainty, be allowed to *find some hints* toward the unravelling and establishing of the great laws which govern the vice of drunkenness the world over. The laws of nature are marvellous in their wide-spread and sometimes most hidden influence. Looked at broadly, they seem to govern all incidents, even those apparently most subject to the influence of human caprice.

By the rigor of modern statistical science, we can foretell the number of suicides that will be committed during any season, or part of a season, in any of the great capitals of Europe or of this country. This can be said of most if not all human events. Can we not therefore hope to learn by these widely spread, if not numerous data on intoxication, some of the laws governing this terrible evil of our race? If we can do this, we may be better able to solve that most important question to us of the present hour, viz.: the prevalence of this vice and its treatment in Massachusetts.

The correspondence was begun, in fact, in order to fulfil the law of the State, which requires the Board to report from time to time whatever information it can obtain upon this vast subject.

Analysis of our Correspondence.

This correspondence is distributed as follows:—

From Europe,	28	places.
Asia,	3	"
Africa,	2	"
South America,	6	"
Canada,	1	"
West India Islands,	3	"
Islands of the Atlantic,	3	"
Sandwich Islands (Pacific Ocean),	1	"
Malta (Mediterranean),	1	"
Australia,	1	"
United States,*	3	"
	52	

Love of Stimulants a Human Instinct.

The first deduction we can make from this correspondence is that this appetite for stimulants is one of the strongest of human instincts. It is seen in every nation, in all quarters of the globe. Savage or civilized man alike purchases or makes his appropriate stimulant. Nature seems in fact unbounded in its liberality in this particular. For wherever on the globe he may

* In this estimate the valuable correspondence from Massachusetts is considered as a unit.

be, man finds some means for exhilaration or for soothing himself amid the cares and trials that he may meet. Having been made a free agent he is permitted to use or abuse this bounty, and his own tendency to drink. Deeply rooted as any of the human instincts, this tendency may, if unrestrained by conscience, reason and education, bring disaster and often ruin in its train.

It varies under different Influences, Climate, Race, Fashion, etc.

But the tendency to inordinate indulgence and intoxication seems to vary with varying climatic law; with the character of the race, and according to the fashion or taste that may have been modified by centuries of custom or of law; with the character of the stimulant used; and finally, with the cultivation or non-cultivation of the grape. In other words, this correspondence seems to indicate that intemperance is governed by great cosmic, social and industrial laws. These should all be duly considered in any practical treatment of this vast evil.

I will arrange what I have to say on this part of my subject under the following heads.

1. Intemperance according to isothermal lines.
2. Intemperance according to race.
3. Intemperance according to the character of the stimulant used.
4. Intemperance as influenced by the culture of the grape.

I trust that I shall be able sufficiently to show that each and all have important bearings upon the sacred cause of Temperance in this State. I am convinced that in all efforts here in behalf of that cause, they must be duly weighed, not only by legislators who would enact laws for the prevention of Intemperance, but by the whole people.

Intemperance according to Isothermal Lines.

Our correspondence points to the existence of a great cosmic law which influences the prevalence of intemperance over the entire globe.

Near the equator, where man is constantly subjected to the direct and powerful rays of a vertical sun, and where the

human body is as constantly bathed in perspiration and perhaps panting with excessive heat, there seems to be less need of stimulating drinks than in countries farther removed from the equator.

Correspondents assure us that in the tropics intemperance in the use of liquors is very rare. One speaks of it as a "social crime." A man may be a gambler, or the grossest of libertines, and still be received as an equal in polite society, but if guilty of intemperance he loses caste as one who violates one of the sacred laws of social life. Moreover the people of the tropics, when using these strong drinks, *sip* them from small "*liqueur*" glasses, from which it would be impossible to get the long and deep draughts so common in these northern climes.

These may be said to be the characteristics of the drinking customs of nations living between the isothermal lines of 77° Fahrenheit, north and south of the equatorial line of 82° 4′ F.

On the chart they are marked green, and all but two lie between 77° F. north, and 77° F. south.

Proceeding northward, as we know by our European correspondence, and as we may infer also southward over similar tracts of country in the southern hemisphere, viz.: between the isothermal lines of 77° Fahrenheit, and 50°, north and south, we find regions where the grape-vine grows luxuriantly, and each man may, if he choose, have his own vineyard. We know that in Europe these regions are covered by the richest vineyards and that very many kinds of light and but gently stimulating wines are made. These wines are drunk freely by all the inhabitants. In some districts the babes drink them as they would their mother's milk. They are used by young and old.

In Spain some writers declare that wine is more common than water, a fact very easy of belief by any one who has ever driven dry-shod over the bed of one of the noblest of the rivers of Spain. The vine grows on an arid soil, and the grape-juice becomes the universal beverage.

Intemperance while being still quite rare is less disgraceful than at the tropics. We hear nothing of its being a social crime. Occasionally a man will reel staggering home supported by wife and friend on either side. He is mild, and only unduly elated. His excitement bursts out into flashes of drunken

wit or joviality. Rarely if ever does he become malicious or cruel. He is "jolly drunk" not "crazy drunk," as men so often are with us, so says one of our most intelligent correspondents. On the chart, these are marked purple, yellow, orange and blue.

Finally we come above the isothermal lines of 50° F. north, and probably south. Over these regions the vine, although it is found wild, is of less luxuriant growth, and the grapes seem less fitted for the making of wine than grapes grown nearer the isothermal line 77°. But whether it be owing to the imperfection of the grape matters but little for our statement, which I believe is true, viz.: that Russia and all the great Scandinavian people, the Anglo-Saxon and Celt of Great Britain, above 50° F., drink deeply and of more fiery liquor, than the men of the South. Instead of simple exhilaration such as is generally seen on the shores of the Adriatic and the vine-clad hills of Southern Germany and Spain, the dwellers along the Baltic and the northern seas drink even to narcotism, and lie in beastly intoxication perchance in the very gutters of many a northern city. All these except one (viz.: Ceylon a British colony) lie above 50° and are marked scarlet and with a cross.

All this information from our correspondents may be condensed into the statement of a general law, which I will now lay down as I deem it shadowed forth by them:

Intemperance prevails the world over, but it is very rare at the equator. The tendency increases according to latitude, becoming more frequent, and more brutal and disastrous in its effects on man and society, as we approach the northern regions.

Cosmic View of Intemperance.

It would seem therefore as if the burning zone of the tropics took from man the desire for intoxication from alcohol, while it induces him to while away the hours under the fumes of opium, tobacco, or of hasheesh, or in the drinking of coffee or of tea. In the central regions of Europe the taste for alcohol increases, and here bounteous nature provides abundant crops of luscious grapes, which serve not only for food, but also afford the mildly stimulating wines which can be used *temperately* by every age, and apparently without evil. If indulged in excessively they

will of course produce intoxication, but even that, though a little more frequent than in the tropics, is rarely of that demoniac or narcotic character seen in the North of Europe, and throughout the whole of our own country.

Finally, above the isothermal line of 50° F. north, and when we get into the colder regions of the earth, man dresses in furs, and heats his houses with furnaces. He drinks fiery potions, which give a glow to his system which enables him, as he thinks, to defend himself more easily from the bitter cold climate in which his fate has placed him. The northern babe, by the very fact that he is born amid snows, tends more to fall into intemperate habits than his young peer of the tropics. The passion for drink lies dormant but fiercely threatening the northern youth, while some of his other animal passions are checked by the same influences of climate. The very reverse happens to the youth of the tropics. Heat checks the love of liquor, but stimulates to unbridled licentiousness. All this may seem very frightful, and some may ask, if I attribute so much to climate, how can any one escape? It is not for me to answer the question, but I know of no good reason why, notwithstanding such a question may be asked, the vast influence of climatic law should not be broadly stated,—and a germain statement should not be neglected, viz.: that as we approach the north the vine disappears, or produces a grape less fit for wine, and that, to meet this want of some stimulus, man distils an ardent spirit from grains or roots, which too often proves a curse to himself and to his progeny. For these strong liquids when used intemperately encroach more upon the vital forces of man's nature than do the wines of the central portions of the earth.*

* I find in Beckwith's "Practical Notes on Wine" (London, 1868) the following quotations: "Prof Liebig writes, 'wine as a restorative, as a means of refreshment when the powers of life are exhausted, as a means of correction and of compensation where misproportion occurs in nutrition and the organism is deranged in its operation, and as a means of protection against transient organic disturbances *is surpassed by no product of nature or art.* * * In the rich cities of the Rhine, wine is the universal medicine for the healthy as well as for the sick, and it is milk to the aged.'" (page 73.)

"Of spirits" he says, "he who drinks them draws a bill, so to speak, on his health, which must always be renewed, because for want of means he cannot take it up. He consumes his capital instead of his interest, and the result is the bankruptcy of his body."

Mr. Druitt (Report on Cheap Wines) says, "It is not only in a medical point of view, but as a friend of sobriety and morals that I venture to advocate the larger use of wine, i. e. pure wine as a beverage." (Beckwith, page 74.)

Climate in America peculiarly stimulating.

In further proof of the influence of climate, and at the same time to give a warning to our people in regard to the use of liquors in America, I may add the well-known fact that Englishmen on arriving at this country find themselves unable to bear the same amount of liquor of any kind that they have always used with impunity in Europe. The peculiarly stimulating nature of our climate excites the nervous system so much that we should endeavor to be *more* temperate in this country than the nations living in Europe between the same isothermal lines need to be. The following curious facts illustrative of this statement I had from an intelligent physician in this neighborhood:—

Two Englishmen were travelling at their ease through New England, and continued the same amount of stimulants they had always used. They were quite astonished when after a three months' trip they were both about the same time seized with an attack of delirium tremens, which had never afflicted them in England.*

Similar but exactly opposite results have been noticed by Americans when visiting Europe. Many a total abstinence man in America has been led while in Europe to use the mild wines of those regions in moderate measure, but as a common beverage at his dinner, and this with decided advantage to his general health. On his return to this country he is often either unable to use similar wines, or he has no desire for them.

Intemperance as influenced by Race.

From what I have heretofore stated it seems that a child born in England or in any country above 50° F. is by that very fact more in danger of falling into intemperance than one born in Spain or Italy or on a spot still nearer to the equator.

But in addition to this powerful climatic law each nation seems to have its own peculiar tastes in the choice of stimulating drinks. Each one also is now perhaps suffering or is benefited by these tastes as influenced by customs or fostered by fashion or by bad or good laws. The Scotchman of the present

* For curious differences of climatic effect on the nervous system in California, New England and Great Britain, see Dr. Tyler's statement, Appendix, 13.

hour drinks his strong whiskey, poetically styled his "Mountain Dew." The Hollander grows duller and more sluggish with his gin. Drunkenness and crime follow in the train of these two liquors. The volatile Italian and Spaniard drink their mild native wines as freely as they do their mother's milk. Neither of these becomes a nuisance to themselves or to others by beastly intoxication. The Frenchman and the people of some Swiss countries are, if we may trust to recent academic* discussions, giving up the unadulterated juice of the grape, and are being undermined in health and morals by the powerful but seductive stimulus of brandy, absinthe, or of Schnapps.

The excitable Irishman *swallows rapidly* his strong whiskey containing often more than fifty per cent. of alcohol. Even in small quantities this stirs up his combative qualities; or if perchance the shillelah is brandished at some "vanity fair" as a matter of pure "fun!", it is often wielded so formidably that his neighbor's head is as readily broken as when the weapon is swung in the deadly fight.

On the contrary, the naturally sedate German *drinks slowly* in beer saloons and, amid clouds of tobacco smoke, from huge Lutheran cups, his favorite lager beer containing about six per cent. of alcohol. He may become merry or he may become dull, but he rarely if ever fights.† The American Republic, though broadly British in its origin, and therefore inheriting British tastes for strong liquors, has become by immigration truly cosmopolitan. For more than a century men from every country have taken refuge here and have brought their national habits with them. America in her fertility of resources has increased this love of strong liquor. "American drinks," with all their grotesque nicknames, are fast becoming bye-words for the confirmed sots or the youthful devotees to drunkenness throughout Europe. The native American, I regret to say, tends rather to the Celtic than to the German habits of drinking.

* See recent debates in the French Academy of Medicine.

† In continuation of this subject and for curious details relative to Russia, Sweden, Norway, Australia, Feejee Islands, Kamtschatka and West Indies, see Appendix, 6, 7, 8, 10, 11, 12.

Races are educated to use Strong Liquors by Bad Laws and by other Influences.

That races may be so educated by evil legislation and by other influences in this matter of using intoxicating drinks we have a singularly interesting example in the *present* condition of England. The country has been educated in its tastes for strong liquors to a higher degree than mere climatic law would have carried it. Bad legislation and wars, especially between England and France, have been the agencies that have been at work.

The Romans when they had possession of the country cultivated vineyards, and they flourished well in the south of England. After the overthrow of the Roman power and during the disturbed times of the early and more modern history, grape culture was neglected.

Alfred the Great, in the ninth century, wisely ordered its renewal, and brought over to England foreign fruit-growers. At the time of the Norman Conquest vineyards were found in many of the warm and fruitful valleys where the cloistered monks had built their abbeys. Vine Street at Westminster still points to the royal vineyard of those days and near by and under the protection of royal and knightly castles vines were grown and wines made.

But as the climate of England was not so favorable as that of France for grape culture large quantities of wine were imported in the tenth and eleventh centuries. In 1373, according to Froissart, no less than two hundred ships went annually to Bordeaux in the wine trade.* Similar statements in regard to the foreign cultivation of the grape in England are found at page 470 of Sir Edward Barry's singularly interesting work.† It would be fortunate for England if matters had not been materially changed from this.

An author ‡ who has studied the subject writes as follows:—

"Down to the time of the Revolution of 1688 great quantities of

* Geschichte des Weins und der Trinkgelage—Ein Beitrag zur allgemeinen Kultur und Sittengeschichte nach den besten Quellen bearbeitet und populär dargestellt für das deutsche Volk, Von Rudolf Schultze. Berlin, 1867, p. 82, &c.

† Observations Historical, Critical and Medical on the Wines of the Ancients, etc.; by Sir Edward Barry, Bar. London, 1775.

‡ Wines and Wine Countries, etc., by Charles Tovey. London: Hamilton Adams & Co., 1862.

French wines were imported to the extent, in some years, of 20,000 tons. The jealousy toward everything French after that time induced the laying on of enormous duties by the legislature." (p. 53.) In 1703 by the treaty of Methuen they practically excluded the light wines of France, and the English were forced much against their will to seek in Portugal the strongly fortified port. (p. 56.) This has been unfavorable to the moral status of England. For the long-continued use of the coarse and rough vintage of Portugal, made additionally so by the addition of spirit, caused the relish for light and delicate wines to decline in England." (p. 57.)

The writer hopes for much good from the recent treaties brought about by Napoleon the Third and Mr. Cobden. Already the use of claret is becoming very common and stronger beverages are less used.

In the work above cited, I also find the following quotation from a speech made by the present prime minister, Mr. Gladstone, in 1861, when alluding to the same fact (page 18) :—

"The taste for wine in England is materially connected with the course of our politics and the revolution of 1688, but still more the Hanoverian succession and our wars with France contributed greatly to alter the taste of the country, so that those who before loved light wines began to love sherry wines. I believe it is on record, that the University of Oxford petitioned Parliament against the grievance of laying heavy duties on light wines, and compelling them to drink port."*

I quote these passages, 1st: to prove that we in the north of this country, coming as we do chiefly of the British stock, not only have the same climatic law that prevails above 50° F., but that we likewise inherit this taste for strong drinks as fostered by English folly.

2d: as a warning to our people. By our present unwise and high tariff on the mild wines of Europe, the people of this country are led to use the only drinks provided for them, viz.: the coarser liquors. Are we not, in so doing, following exactly

* Macaulay (History of England Vol. 4, 235) states that in 1648 wine was given up from hospitable homes and punch put in its place, and worse than the change of brandy and lemonade for claret, was the increase of crime in 1692. Like causes produce like effects, and as in England during the 17th century, so it is now in the 19th century in America. We shut out light wines and beers of the same class, and instead thereof we have whiskey without stint.

in the absurd way, I do not say wicked example, set by England two centuries ago? The civilization of monarchial Britain of the 17th century governs in fact Republican America of the 19th. God grant that we may take warning in due season.

Intemperance influenced by Fashion.

There can be no doubt that the custom of having liquor openly displayed upon the "sideboards" of our ancestors, and the correlative custom of inviting every visitor to "take a glass" with the host, was in former times a source of unmitigated evil. It often terminated in exciting to gross habits of intemperance on the part of the host and of the guest. Especially was the latter too often the victim, if he happened to be of a profession like a physician that required a daily round of visits. He might begin his circuit with mind bright and clear, but he concluded it in a very different condition. As these *private* "*bars*" have been, by fashion closed, we may hope fashion will, at some future time, consider him that keeps an *open public bar* as much out of the pale of decent society as any estate holder, who should revive this custom of olden time to which I now refer.

Some of our foreign correspondence allude to the evil custom we have in America of "treating" one's acquaintance to a "drink" at any hour of the day. They speak of it as most deleterious, and as not existing in the countries where they reside. In fact, I believe that the custom of pledging friendship in flowing cups of "grog," is almost peculiar to this country. It is a curious fact, moreover, that this fashion becomes more and more dictatorial as one proceeeds southward in the United States. In some places in our southern country, to refuse to muddle one's brains with liquor, to be drunk at an open bar at the invitation of a friend, is among the grossest of insults!

Fashion thus overides, for a time at least, all climatic laws.

Open Dram Shops an unmitigated Evil.

Every one, I think, will admit that among the most pernicious customs of this country is the support given by the community to open dram shops, where the coarser liquors are exposed for sale to all comers. It is the *great evil of our country*. Our correspondents give us important information on this subject.

They are open at St. Croix (tropics), but the people there drink liquor in small quantities. "Twenty years ago they were frequent at Frankfort in Germany. Brandy was drunk freely. Of late years in *consequence of improvement in beer, and the introduction of coffee, these shops have nearly wholly disappeared, and intoxication has decreased.*" "Drunkards have disappeared" (page 285 Report). There is no doubt, whatever, that to devise some way whereby such shops could be, with the unanimous consent of the people, effectually closed in our country would be of the greatest moral, physical and pecuniary benefit to the nation.

I recently had a conversation with a German keeper of a lager-beer saloon. Although, in the eyes of some of our temperance friends, we should not expect much wisdom from such a source, I got matter so full of common sense, that I will give the substance of it:—

"Your dram shops for the sale of whiskey and strong liquors are very bad for the people, besides being very expensive. A young man enters one of them intending to take only *one* glass of whiskey. He meets friends and asks them to 'take a glass' with him. In so doing he *pays* perhaps *three or four times* as much as he originally intended.

"The liquor immediately and rapidly swallowed flies into his head. But his companions to return the compliment, perhaps in turn, ask him to drink with each one of them, and then he falls into a still greater difficulty. For he loses wholly his head, after having previously spent more money than he intended. The loss of a whole day of work, and perhaps an arrest for drunkenness with entanglement in the law, and a fine or imprisonment, may very probably be the result.

"The Germans do not have such a custom in their lager-beer saloons. A German may be drinking his beer as his friend enters and he passes his own mug to him to drink from. His friend sips and courtesy is satisfied. Then both sit down, perhaps at the same table, and *slowly drink* a large quantity of lager-beer. Doubtless they both become merry, and German songs may be the result, but rarely, if ever, do the terrible evils follow which so often flow from *one* glass of whiskey when *drank rapidly*, and while standing at one of your open bars."

In fact, as my informant added as a final remark, "Any German who habitually gets intoxicated in the lager-beer saloon, is avoided by the company assembled. They keep away from his table and do not invite him to their own."

Surely no reasonable man can doubt which of the two customs is the better one, or fail to see how very deleterious our custom must be.

Legislators cannot neglect these great Cosmic and Social Laws.

In all his dealings with intemperance in this country the real statesman *must* consider these primal influences of the climate in which a people lives, and of these tastes of the race. In our country the question is presented in a more complicated form than in any other, from the very fact of the great variety of people that forms our nation. Doubtless this makes legislation more difficult, but that is no reason why a statesman should ignore these great facts.

Crime in consequence of Intoxication.

One of the questions asked our foreign correspondents was the amount of crime caused by intemperance. The following table presents the results of an analysis of their opinions on this question :—

TABLE *showing the relative Amount of Crime consequent on Intoxicating Drinks according to the Temperature of the Places in which the Crime occurred.*

Large Amount.	Isothermal.
Edinburgh,	41.50
Dublin,	"
Manchester,	"
Toronto,	"
Berne,	50.59
Odessa,	"
Rotterdam,	"
Utrecht,	"
Zurich,	"
Medium Amount.	Isothermal.
Copenhagen,	41.50
Leipsic,	50.59
San Juan del Sur,	82.4
Very Little.	Isothermal.
Elsinore,	41.50
Frankfort,	50.59
Japan,	"
Trieste,	"
Athens,	59.68
Cadiz,	"
Fayal,	"
Funchal,	"
Italy,	"
Beyroot,	"
Lima,	68.74
Pernambuco,	77.82
St. Croix,	"
Cape Haytien	"
Trinidad de Cuba,	"
Zanzibar,	"

TABLE—*Continued.*

Among Foreigners (chiefly American-English).	Isothermal.
Trieste,	50.59
Beyroot,	59.68
Malta,	"
Athens,	"
Cadiz,	"
Constantinople,	"
Egypt,	68.77
Lima,	"
Nicaragua,	77.82
Pernambuco,	"

Increase since Using Spirits (arrack).	Isothermal.
Ceylon,	77.82

Due to Spirit, not to Wine.	Isothermal.
Italy,	59.68

A glance at this table reveals the fact that where the temperature indicates a colder region, and, consequent on the above-named climatic law, where *ardent spirits* are used to the exclusion of milder stimulants, there crime in consequence of intoxication is more prevalent. Even the apparent exceptions to this statement admit of explanation, and seem to prove only the over-powering influence of race or of the religion prevailing in the place, or that a mild stimulant is used.

For example, Elsinore in the North, between (41.50) and Ceylon at the equator, (77.50), have some peculiarities which at first sight seem to render them exceptions. In reference to Elsinore, our correspondent states that the people are remarkably peaceable and orderly, having no rowdyism in the streets. "The police magistrate states that no cases of murder, homicide or theft which have been brought before him could be traced to the influence of drink."

"Arrests for street disorder are very rare among the inhabitants, and chiefly confined to foreign seamen."

But a very important point, as we shall hereafter see, is the fact, that a "mild, very thin and weak" beer, ranging in price from one to four cents per bottle is drunk, averaging about twenty gallons annually to each head of the population. "This large annual consumption does not seem to have an injurious effect on the health of the people,"—as they are a strong, hardy race and "with an average duration of life greater than in the United States." With this mild beverage a little less than one-quarter of the same amount of corn brandy is also drunk. The mild beer is evidently the favorite beverage of the people.

In the case of Ceylon, we have only to know that the island has been governed by the English race since 1815, having been previously under the Dutch, and that by the habits of these two races the island has been overshadowed. The same results have come out on a grander scale in America from similar colonization. In Ceylon the habits of race have overrun all climatic law. Palm toddy and arrack are everywhere used, and the right to distil the latter is a source of revenue to the government. Opium and hemp are added to these stimulants and used by Malays and Hindoos. It would be amusing if it were not sad to read the following final comments from our correspondent. It is so like what is often asserted about similar police matters in various parts of Massachusetts. "Arrack drinking and gambling are at the root of much of the crime committed in Ceylon, and the police, rural and regular, require, to say the least, strict looking after."

It seems to be undoubtedly true that crime in the North is in the vast majority of cases consequent on intoxication. Our Dublin correspondent is especially earnest on this point.*

The following data from the report of the chief of the police of Boston, and the last census report (not yet printed) become very interesting in this connection, if we believe that the Irishmen of Boston do not in one generation change much from the Irishmen of Dublin, and that the habits of the staid German, man or woman do not change much if you transfer them from the neighborhood of the Black Forest to Boston.

The report is given under the title of "Nativity of Prisoners."

The following table made from these two sources shows first, the number in Boston of Irish and Germans; second, the number of each nation; third, the percentage of prisoners to the whole population:—

* Mr. Justice Lamson in his address to the grand jury at Armagh, 1869, says that "all the crimes we meet on circuit are more or less directly or indirectly caused by drunkenness."

	Population.	No. of Prisoners.	Percentage of Prisoners to the Population.
Irish, ...	56,900	14,673	25.78
German, ...	5,606	364	6.49

The extraordinary difference between the percentages of crime perpetrated by the German and Irish is a peculiar fact, to be interpreted partly by the differences in the temperaments of the two people, but still more I am inclined to believe by the difference in the liquors used by the two. I cannot but think that if the Germans were to drink rum and whiskey as the Irish do, a much larger proportion of crime would be found among them than now, for whiskey does not, so far as I know, affect a German's body differently from an Irishman's body. I would likewise suggest the following proposition: Take away the whiskey from the Irishman and persuade him to use lager beer or Bavarian ale, and perhaps you will take from him a good deal of his pugnacity, and he will be less frequently drunk.

But if we had been unable to get official statistical returns, it must have been evident to every one that whereas an American, or an Irishman is almost daily seen drunk in our streets, a German is very rarely found so. In truth I do not remember to have ever seen a German reeling home intoxicated, or sound asleep on some doorstep, evidently narcotized as the Yankee or Irishman is likely to be by some violent liquor.*

This fact is as above suggested due partly to the different excitability of the races; but still more to the fact that they have been for centuries educated to use two very different kinds of drink.

To sum up all, we may say that two factors enter into the commission of crime consequent on intemperance, as they do into the prevalence of intemperance itself. It appears, 1st: that crime due to drunkenness increases as we go from the equator. 2d: that a mild stimulant used even in the North probably does not lead to crime as stronger liquors do.

* See Appendix, 4.

Relative Amount of Intoxication in America and Foreign Countries.

The opinions of our correspondents are almost without exception unfavorable to the United States. We have the tastes for intoxication which climatic law and long years of habits of intemperance on the part of our English ancestry have engendered, and all these influences are increased vastly by the stimulating nature of our own American climate—at least that found along the Atlantic slope.

Dublin, Manchester, Ceylon and the Netherlands would seem, with doubtless some others at the North, to vie with America. But in the majority of instances other countries stand vastly higher than we do in their exemption from intoxication.

Are all kinds of Ales, Beer, Rum, and distilled Alcoholic Stimulants to be classed as alike equally and always injurious?

Some writers in this country and in Europe in their zeal for the noble cause of temperance, take the affirmative of this question and claim that alcohol in any form is "*always a poison.*" I cannot hold this opinion, nor do I think that the clinical experience of any physician will admit of it.

The subject is frequently touched upon by our correspondents. Professors Tilamus and Swingar, of Amsterdam, write in favor of abolishing even the moderate use of strong drinks as "always unhealthy" and "against the moral development and material prosperity" of any people, and "as the greatest underminer of the actual welfare of mankind" (p. 345).

The Secretary of the Netherland Society for the abolition of strong drinks, writes that "gin is the beverage of the people and to such an extent as to create a general anxiety about the future of the nation." He adds, "we believe that every drop of alcohol is injurious and the beginning of wilful poisoning." He likewise states that "gin drinking is becoming indecent" (p. 340).

Another correspondent, on the contrary, writes from Trieste (p. 334), that "the drinking of wine and beer is universal." "From infancy to age they (wines) are the common beverage, but are generally, as by Homer's heroes, mixed with water." The same writer admits that on Saturday night a pretty large number of laboring people are "jolly drunk," but not "savage drunk." The latter condition is "unknown"—*save among English or American sailors visiting the port.*

Among the better classes "no instance is known of a merchant, lawyer, physician, shop-keeper, or master mechanic, becoming an inebriate and gradually losing position, prosperity, and business, and sinking into a drunkard's grave." One or more Englishmen and Americans, however, ruin themselves by the use *not of wine but of spirits* (p. 335).

In Ceylon "arrack" (like whiskey) "is an unmitigated evil and ruins many every year." Let it be remembered, however, in this connection, that Ceylon has been for nearly three generations a *British* colony.

In Russia "Vodka" (like our whiskey) drinkers are seen staggering through the streets, "or lying insensible in some corner" (as observable so often in New England). But among the wine tipplers, even when drinking freely, rarely are seen drunkards (p 301).

Our ambassador from Greece (p. 258), says: "Alcoholic drinks, spirits, rum, &c., are very deleterious in these warm countries. This fact and the comparatively high cost of these stimulants limit their consumption. The light wine of the country, on the contrary, is generally regarded as harmless in its effects, if not positively wholesome, when drunk in moderation." And even when used immoderately it, in some instances, at least, seems to do little harm, if we may trust the story by our correspondent of an old priest, over ninety years old, who had drank twelve bottles per diem for many years. While we must admit that such habits as this Bacchanalian priest had can scarcely be called temperate, it seems to indicate that there is a vast difference between the effects of native mild wines, and our strong distilled alcoholic stimulants. The well known and astonishing infrequency of death from delirium tremens and diseases of the brain in Athens consequent on liquors drank, confirms the above.

Our correspondent, the Hon. John Jay, minister to Austria, entered most warmly into the questions proposed by the Board, and through his influence we procured statistical proof from the Statistical Central Bureau of the Austrian Empire. The facts are terrible and show conclusively that very different effects are produced on the human system by different liquors. It seems that the various species may be arranged in three categories, according to the violence of their effects: First, and mildest,

beer and ale. Second, mild, native, "unfortified" wines. Third, ardent spirits, rum, brandy, whiskey, and strongly fortified wines.

Mr. Jay in his letter writes: "I am advised by those in whose judgment I have confidence, that the chief intoxicating drinks in Austria are beer and wine, and that but a small amount of spirituous liquor is consumed excepting in Galicia; that the relative consumption of wine by the people is diminishing, and that of beer is increasing; that the beer in general use is of light kind requiring the consumption of a large amount to stupefy or intoxicate." Among other items quoted by Mr. Jay, is the fact that "each inhabitant of Austria-Hungary expends eight times as much money for spirituous liquors as he does for iron, the most important agent of active industry (p. 307).*

Again, the different provinces of the country show the different effects of the ale, wine, and ardent spirits. Three groups of provinces can be named as varying most. They can be classified according to the liquor most generally used. It is found that the Western Provinces, where beer is most used, stand highest; the wine-consuming Hungarians, are much below them; "while the Galician peasant who ruinously exchanges for brandy his corn before it is ripe and while yet in the pod, is lowest in the scale of industrial development. Indeed the degeneracy of the race in Galicia, although perhaps other agencies may contribute to it, is to be sought mainly in the excessive use of corn-brandy, and thence it comes to pass that out of the men called to military duty in Galicia, 37.9 per cent. are rejected as unserviceable on account of physical disability and infirmity, and 18 per cent. on account of under stature. Accordingly, in all, 55.9 per cent. of those called are unserviceable in the army, while in the entire monarchy 33.5 per cent. are rejected on account of physical disability and infirmity, and only 9.2 for under stature" (p. 308).

Our correspondent at Berne confirms this view by the following statement (p. 263) :—

"A very intelligent gentleman at Lucerne, a member of the cantonial legislature said 'that some years since he had the charge of enrolling the citizens of that canton subject to military service and

* Statistical Central Bureau of Austria, from the Minister of the Foreign Office.

was struck with the difference between the people where wine is produced and has always been a common beverage, and those of other districts where wine is not used and schnapps is the common drink. The physical superiority of the former class was, according to his account, very striking and the percentage of able-bodied men in the wine-producing districts very much greater. He attributed the difference in great part, if not to the positive virtues of wine as a beverage, at least to the positive evils produced by schnapps-drinking.'"

Our correspondent, it is true, suggests that soil and generous climate and greater wealth may have had some influence in this result. Whatever may be the various causes contributing to the result, we cannot shut our eyes to the facts brought forward by the Austrian minister, supported as they are by those from Switzerland. To me they seem to confirm what medical experience teaches, that rum and ardent spirit drinkers lower their own vitality, and the children of drunkards are more puny than those of the more temperate.

Ardent Spirits used intemperately Crush out Manliness, and Dwarf a Race.

Thus we get from our correspondents a most shocking array of evidence proving that the free and intemperate use of *ardent spirits* not only crushes out manliness in a man or woman, but actually dwarfs the offspring. The sin of intemperate use of ardent spirits is visited not only upon the third and fourth generation, but must act in all time unless radical reform be instituted. Even if a reform be begun, several generations will be needed to redeem the progeny of such a degenerate race. What a warning this to our country in regard to the use and abuse of *ardent spirits*.

But while admitting this much in regard to the frightful injury to human society arising from the *intemperate* use of "*ardent spirits*," I must still deny wholly the affirmation of the question that it suggests that alcohol is *always a* "*poison*."

Nevertheless Alcohol is at times needed to save Human Life, or relieve Human Weakness.

I believe that physicians do at times save human life by using various stimulating drinks with the utmost freedom. Moreover I do not believe there is a single article in the materia medica

that in its various forms of elixirs, tinctures, extracts, &c., or when simply combined with water, is more necessary than alcohol in the treatment of disease. I know that some excellent friends claim that sometime in the future "good times" something will be found that will supersede the use of alcohol. They hope for this, believing as they do that it is always "a poison." But even while they assert this they use these very poisons in their daily practice. I think there are but very few, if any, who are confident that *they* will ever see the time when they will be able to give up such use.

It is well for us all to deal frankly on this subject. It is time now to look at this question fairly and simply. I take the following position, and I fearlessly assert that clinical experience proves, if it prove anything, that every form of stimulant now in use can be made a blessing, if used temperately and on proper occasions. But I likewise most freely admit that if used intemperately and improperly, each and all may become "poisonous" to the last degree. Yet more, I believe that even when used intemperately, light beer, ale, lager beer, wines like claret, &c., do vastly less harm than the stronger ardent spirits. In truth, the former cannot produce intoxication except after the swallowing of a very large quantity, so large that before intoxication is produced the disposition to drink is satiated, whereas the stronger liquids cannot be taken save in the smallest quantities without danger of intoxication. Moreover, the fact of the habitual and long-continued use of ale and of the milder light wines without manifest evil is not observed in the long-continued use of even small quantities of strong stimulants, such as brandy, rum, whiskey, schnapps, absinthe, &c. Such intemperance with these drinks is *always deleterious*. Man, under the continued influence of the tribe of compositions known in America under the various slang terms of "gin-sling," "cock-tail," "brandy smashes," "mint juleps," "eye-opener," &c., &c., is liable to become at any time a beastly drunkard.

And a man who, knowing this, voluntarily exposes his mind and body to the influence of these ardent spirits, commits an act which, *a priori*, one would deem impossible for any reasonable man voluntarily to perform, any more than he would con-

sent to have himself changed into a chattering fool or a savage brute.

Yet the same amount which produces in ordinary cases such terrific results becomes under other circumstances the wisest and most blessed treatment in some severe diseases. Dr. Anstie* gives the case of a lady who when flooding to death took *a bottle of brandy in two hours*, not only without intoxication but with the single effect of producing sleep for ten hours, but no real intoxication, and life was saved. It was actual food to a bleeding fellow creature starving for want of its own blood.

In a similar manner many persons from their earliest youth, believers in the principle of total abstinence, have at certain times later in life found help in wine or brandy. I have heard that one of the most decided of the temperance men of this community, one who in previous years had persuaded many physicians to assert under their signs manual, that alcohol is not necessary in medicine, became at a later and feebler period of his life a daily *temperate* drinker of brandy. He found it necessary to his daily support. I think I have good grounds for the belief that there are hundreds of persons in this community, especially women, who would be much benefitted if they daily would use light wines or lager beer, and substantial food, instead of the water, or tea, or coffee, and the variety of pies, doughnuts, pickles and cake so common in New England.

There is no doubt that the American people as a whole do not by any means as yet understand the true philosophy of food and drink, and this opinion held by many and which has been the basis of State legislation for years past, viz.: that *all* liquors are in themselves nothing but evil, and equally evil if once taken into the human stomach, proves the truth of this assertion. It is radically and wholly erroneous. Those who claim to be the especial apostles of temperance say that every one who drinks at dinner a glass of sherry or of claret or hock or even of lager beer sets quite as bad an example as the most incorrigible drunkard. In drinking even thus moderately, "temperately," he proves that he does not believe that alcohol under every form and at all times is a "*poison*," and there-

*On Stimulants and Narcotics, page 459, by Francis E. Anstie, M. D., M. R. C. P. London: Macmillan & Co., 1864.

fore to be absolutely and at all times even in the smallest quantities prohibited.

Intemperance as it may be hereafter influenced by the Cultivation of the Grape and by the making and using of mild native Wines and of Lager Beer—Grape Culture and Lager Beer in America.

It is the general view presented by our correspondence that in the wine-making districts of Europe intoxication is less frequent and less severe than in our country. Unfortunately we have never *extensively* cultivated the grape with the idea of making wines. Believing in the grape culture as a means of promoting temperance, I know no more melancholy sight than that which our country presents at the present hour in reference to this culture. Although lying exactly within the area capable of growing thousands of vineyards it has, till within comparatively a few years, steadily refused to cover its myriads of unused hillsides with vines. The slopes of our mountain ranges might grow green under vine terraces like those of Europe.

And here I would ask a question full of meaning, as I believe it should be, to all Americans. What would have been the effect on the present condition of our country if two centuries ago we had begun to cultivate widely the grape-vine and had continued to do so until now? Two benign results I believe would have followed, viz.: we should have been, first, a more temperate people, because we should have used less of whiskey and of its vile adulterations; and, second, a vast trade, which in a commercial point of view would have been beneficial to our people, would have arisen as it has arisen in corresponding parts of Europe.

Various individual attempts have been made at sundry times to introduce vineyards into America.

Under date of Jan. 25, 1793, and in writing to Albert Galatin, Thomas Jefferson tells of an experiment made on land near Monticello in Virginia by Mr. Mazzie, an Italian.* A subscription of £2,000 was made and vines procured and several laborers imported. His laborers agreed to serve four years. Three years passed when war broke out, and Mr. Mazzie was compelled to let the place. He went to Europe and the horses of his tenant ruined the vineyard. And thus "ended an

* Works of Thomas Jefferson, Vol. 3, p. 505. Taylor and Maury: Washington, D. C., 1853.

experiment which from every appearance would in a year or two more have established the practicability of that branch of culture in America." Mr. Jefferson was always a hearty supporter of the doctrine of the value of the grape culture as a temperance measure. In 1818, Dec. 13, when writing to M. de Neuville, he thus expresses himself:—*

"I rejoice as a moralist at the prospect of a reduction of the duties on wine by our national legislature.† It is an error to view a tax on that liquor as a tax only on the rich. It is a prohibition of its use to the middling classes of our citizens and a condemnation of them to the poison of whiskey which is desolating their homes.

"No nation is drunken where wine is cheap and none sober where the dearness of wine substitutes ardent spirits as the common beverage.

"It is in truth the only ‡ antidote to the bane of whiskey. Fix but the duty at the rate of other merchandise and we can drink wine here as cheap as we can drink grog, and who will not prefer it? Its extended use will carry health and comfort to a much enlarged circle. Every one in easy circumstances (as the bulk of our citizens are) will prefer it to the poison to which they are now driven by ardent spirits, and the treasury will find that a penny apiece from a dozen is more than a groat from one. This reformation will require time. Our merchants know nothing of the infinite variety of cheap and good wines to be had in Europe and particularly in France, Italy and the Grecian Islands, as they know little of the variety of excellent manufactures and comforts to be had any where out of England. Nor will these things be known nor of course called for here until the native merchants of these countries to whom they are known shall bring them forward, exhibit and vend them at the moderate profits they can afford. This alone will procure their familiarity with us and the preference they merit in competition with corresponding articles now in use."

But why, I ask, should we rest on foreign importations? The vine grows indigenously from far up in Canada down to the Gulf of Mexico and from the Atlantic to the Pacific Coast. Scandinavian adventurers coasting along New England shores

* Works, Vol. 7, p. 110.

† See Appendix 5, Letter from Horatio G. Perry, Esq., late Secretary of Legation at Madrid.

‡ Probably Mr. Jefferson knew little or nothing about lager beer.

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"Reliable statistics convince us that the importation of wine has fallen far behind the rate of increase of population in England and America while the production and consumption of alcoholic liquor have increased in a most astounding proportion. A writer well posted on the subject remarks:—'In our wine-growing countries where the use of wine is interdicted by extravagant duties the consumption of spirits increases to an alarming degree. England, with a population of 24,000,000, consumes 28,000,000 gallons of spirits, exclusive of porter, ale and beer, while France with a population of 33,000,000, consumes but 15,000,000 gallons of her own brandies and of these a larger proportion is used in manufactures, in fortifying wines for shipment and in the preparation of fruits and confections made only in her own territories. The manufacture of whiskey, spirits and ale for home consumption in the United States amounts to 86,000,000 of gallons annually; this is exclusive of exports!' In regard to the high duties on wine in England, Redding says:—'The enormity of the duty is the cause of the diminished consumption of wine. In 1700 the population of England was 5,475,000 and the wine consumed, a little less than 6,000,000 gallons per annum. In 1851 the population was 17,922,000 while the consumption of wine was only 6,448,517. It is clear that the people of England one hundred and fifty years ago drank three times as much wine, in proportion, as they do now. The natural consequence has been the increased consumption of spirits. From 1730 to 1830 the consumption of British-made spirits increased from 873,000 gallons to 7,730,101, keeping pace with the increase of crime as if not only the temperature of the atmosphere but the amount of misery, pauperism and crime were to be gauged by alcohol. Ireland in, 1821, paid duty only on 2,649,170 gallons of home-made spirits, but in 1828 not less than 9,004,539; *i. e.*, in seven years the amount of spirit made had quadrupled! There were made in England, Ireland and Scotland in the year ending Jan. 5, 1850, 22,962,000 gallons. It is a fact, therefore, however much of an anomaly it may appear, that inebriety in that country has increased with the diminution of wine

consumption, and morals, as well as health, have suffered by the same decrease and the augmented use of ardent spirits.' "*

Longworth, of Cincinnati, about 1820, first established permanently the grape culture and wine making in this country. As he did this he felt he was doing a good work for temperance.† And from his efforts the hills of Ohio now resound to the songs of laborers from the Rhine, keeping time to their accustomed work, viz.: upon vine culture and wine making.

Dr. Flagg in his report to the Horticultural Society says‡ (page 48):—

"I am confident that the introduction of pure light wines as a common beverage will produce a great national and moral reform, one that will be received by our temperance brethren ere long as a national blessing, one that will complete the reformation they have already begun. The temperance cause is rapidly preparing public sentiment for the introduction of pure American wines. * * * Just in proportion as strong drinks are abandoned a more wholesome one will be instituted."

Still more recently California has come into the field, and the vine culture has become a most important branch of industry for that State. It is destined to increase almost indefinitely. The result may not be very apparent yet. Those however who have been longest acquainted with that State, assure me that in their opinion the use of the mild wines is supplanting that of ardent spirits, and that "drunkenness is much less common than formerly."§

Finally, only four years since, a book was published which I deem most important as indicating the great advances we have made in this branch of national industry.‖

While admitting that the grape culture is still in its infancy in this country, the author gives important statements on the whole subject. In his preface he says:—

*The Vine: its Culture in the United States. By R. H. Phelps.

† See Appendix 3, Larz Anderson Esqr.'s Letter.

‡ Phelps as above.

§ Appendix 2, Dr. Morrison's Letter.

‖ An Elementary Treatise on American Grape Culture and Wine-making. By Peter B. Mead. New York: Harper and Brothers, 1867.

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"Reliable statistics convince us that the importation of wine has fallen far behind the rate of increase of population in England and America while the production and consumption of alcoholic liquor have increased in a most astounding proportion. A writer well posted on the subject remarks:—'In our wine-growing countries where the use of wine is interdicted by extravagant duties the consumption of spirits increases to an alarming degree. England, with a population of 24,000,000, consumes 28,000,000 gallons of spirits, exclusive of porter, ale and beer, while France with a population of 33,000,000, consumes but 15,000,000 gallons of her own brandies and of these a larger proportion is used in manufactures, in fortifying wines for shipment and in the preparation of fruits and confections made only in her own territories. The manufacture of whiskey, spirits and ale for home consumption in the United States amounts to 86,000,000 of gallons annually; this is exclusive of exports!' In regard to the high duties on wine in England, Redding says:—'The enormity of the duty is the cause of the diminished consumption of wine. In 1700 the population of England was 5,475,000 and the wine consumed, a little less than 6,000,000 gallons per annum. In 1851 the population was 17,922,000 while the consumption of wine was only 6,448,517. It is clear that the people of England one hundred and fifty years ago drank three times as much wine, in proportion, as they do now. The natural consequence has been the increased consumption of spirits. From 1730 to 1830 the consumption of British-made spirits increased from 873,000 gallons to 7,730,101, keeping pace with the increase of crime as if not only the temperature of the atmosphere but the amount of misery, pauperism and crime were to be gauged by alcohol. Ireland in, 1821, paid duty only on 2,649,170 gallons of home-made spirits, but in 1828 not less than 9,004,539; *i. e.*, in seven years the amount of spirit made had quadrupled! There were made in England, Ireland and Scotland in the year ending Jan. 5, 1850, 22,962,000 gallons. It is a fact, therefore, however much of an anomaly it may appear, that inebriety in that country has increased with the diminution of wine

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"Grape culture is fast working itself up to the first position among the productive interests of the country. The capital invested in it may already be counted by millions." "It is safe to say that these products will at no distant day have an important commercial value as respects a foreign trade." "Some of our wines even now sell higher than European wines." "We have no hesitancy in recording our conviction that grape culture may be made the handmaiden of the temperance cause."

I fully agree with all that has been said of the value of light wines as an aid to temperance, but I believe that Germans are destined to be really the greatest benefactors of this country, by bringing to us, if we choose to accept the boon, their lager beer. Lager beer contains less alcohol than any of the native grape wines. This fact with the other fact that the Germans have not the pernicious habits of our people of treating to sharp liquors at open bars, would, if we chose to adopt their customs, tend to diminish intemperance in this country.

What shall we do in Massachusetts to prevent the evil of a too free use of Intoxicating Drinks, and to make our people truly temperate?

If, gentlemen, you have glanced at what has preceded, you will see that if we wish to avoid the manifold evils arising from intemperance we must take strong ground against it, and in favor of radical measures to prevent its prevalence. If it be true that Galicia has stunted the growth of her people by selling its unreaped corn for the whiskey that is to be made of it,—if that nation and Switzerland cannot, in consequence of their use of ardent spirits, produce as many able-bodied men as other nations can,—if the physicians of France, after various academic discussions * of the evils resulting from the use of liquor similar to our whiskeys, rum or brandy, feel called upon to solemnly warn the French nation against the use of absinthe and all that class of intoxicating drinks,—if all these things be true, then surely we should hasten to warn our people. We here are bound by the triple fetters of the laws of climate, of race and of two centuries of habits of intoxication, increased as these have been by wars and by bad legislation.

I would submit therefore the following suggestions naturally prompted by the study I have made on this subject. I hope

* See "Every Saturday," Boston, Nov. 25th, 1871.

that at least some of them will prove serviceable to the cause of genuine temperance.

In all the later efforts made in behalf of temperance it has seemed to me, that in our vain endeavors to gain all we wish by positive law, we have too much ignored the time-honored agencies of education and of moral suasion. We have forgotten that it is impossible in a republic to carry out any law that is unsupported by the deeper sentiments of the people. Unless we can persuade them to believe that a law is just and right and according to the fitness of things, they will not long obey it. The law may be enforced, it is true, in certain instances, much to the detriment it may be of the comfort and of the rights of the individual, but I repeat that no law can be long enforced which is hated and disbelieved in by the people.

On the contrary, I am confident that our people could be gradually led to a higher temperance by appeals to its common sense, while depicting the evils of intemperance, by observing that the use of some liquors is infinitely deleterious, while the "*temperate*" use of others does little or no harm.

We should begin with the young and impress upon them that the use of "*ardent spirits*" tends to burn up their very vitals, and that instead of growing in manly beauty, they and their future children will tend to become a degraded race, and more liable to disease than temperate people are. I would have them see the horribly disgusting nature of intoxication, that state in which man voluntarily gives up all reason and wallows like a pig in his own filth. It would not be necessary to make drunk the Helots of the nation in order to warn our youths, as was done in ancient Sparta. We should only need to show them examples offered daily in all our streets and by-ways, and then warn them to flee from all such abominations. We might carry them to the so-called "sanctities of home" and show them how the home of the drunkard becomes unsanctified. Filled with noisome smells and dirt; the stranger enters and finds both parents wholly incapable of defending their own threshold or their own helpless, starving children. They may perhaps, be spewing upon their own hearthstone in utter irreverence for the idea of what a real home-hearthstone should be. We all, I fear, have been remiss in not doing whatever we can toward educating our youths and maidens to the strictest temperance

and to perfect manliness and womanliness in the use of these dangerous drinks.

In our gatherings for festivity have we always been careful not to provide the grossly intoxicating drinks? I fear not. Have we not heard at times of "snug little rooms" where fiery fumes too strong for delicate nostrils are offered to our young men? Do the clubs act wisely in keeping for *common, every-day use* the more potent liquors? I think not. Have we in season and out of season at our own tables, urged upon our children the accursed influence of intemperance, and the beauty of a manly temperance in all things? And permit me upon this subject of home education to dilate a little more freely though still very generally. I think there are three modes of educating our young people. Two of these often tend ultimately to produce intemperance in after-life, though founded on wholly opposite views on the subject of the use and abuse of intoxicating drinks. The third one I deem the truest method.

In some families all spirituous liquors, mild wines, and light beer, of every nature are looked upon and prohibited as "*poisons.*" The young people grow up under that impression, and are sometimes surprised, when entering upon the more active duties of life, to find that the majority of their young companions have very different views. The previous recluse of domestic life indulges a few times without danger, and then disbelieving the previous parental instructions, which were founded on an untruth, rushes more wildly than he would otherwise have done into unlimited indulgence, with its almost invariable consequence, besotted drunkenness.

In another family the exact reverse of this takes place. Wines and liquors are dispensed freely. Young and old indiscriminately are allowed the free use of them. No cautious words are used, no restraint on the junior members of the house. No warnings are given as to the tendencies to the easy formation of intemperate habits. The youth in such a family is as regularly and as successfully educated to drunkenness as one is educated to any other business.

The golden mean lies between these two extremes. A youth will be less likely to fall into intemperance before whom wine has been, at times, exhibited as a beverage, that may be good for certain times and for certain ages, but which should never be

used intemperately by any one or by those not really needing it, or ever by the young, unless as medicine, or under very extraordinary circumstances.

One thus educated is much better able to meet temptation than those who grow into manhood under either of the other fashions.

To sum up all in one word, what we want in Massachusetts to promote a really godly temperance, is *education* in all the causes of intemperance, education in its gross evils. Moral suasion in public and private, of late too much neglected, and by some I fear, despised, should be more thoroughly carried out. This is the foundation of all true action; without it all effort is vain.

Is there no Common Ground upon which all who desire to restrain Intemperance can stand harmoniously?

It is much to be regretted that there is, at present, no common ground of temperance permitted to exist by the ultra defenders of *either* side of this important question. Some desire total abstinence to be the rule. On the other hand, this idea is resisted by many with an energy which threatens to lead to the *opposite* extreme of perfect freedom in the sale of all intoxicating drinks. But the larger proportion of the community, while working and praying for temperance, do nevertheless use and feel they have a perfect right to use wine or ale if not for good companionship, at least, for the reason St. Paul advised Timothy to use it, viz.: for "thy stomach's sake." Under the banner of total abstinence from all stimulating drinks these latter persons cannot stand. They are *temperate* drinkers, and therefore cannot be received as comrades among those who claim to be the only true defenders of the temperance faith. Let us look a little more closely into this subject of intoxicating stimulating articles. Alcohol is not by any means the only stimulus that brings disease and misery on human beings, although perhaps it is a stronger *inducement to crime* than all others.

Were, therefore, a strict rule made that no articles stimulating to the nervous system should be used by the present party of devotees to abstinence, the dogma would split that party into innumerable fragments. It would probably be divided into va-

rious small cliques, each excluded for its intemperate use of some favorite stimulus, tobacco, opium, coffee or tea, &c. Scarcely a week passes that I am not called to "*prohibit*," in a particular case, all use of the one or the other of these articles.

There are thousands of what could be happy lives were it not for the "demon of intemperance" in the use of tobacco. Not a few cannot now taste a drop of coffee, because of over-indulgence in earlier life, and often am I obliged to cut off tea from a patient and fall back upon the first drinks given by nature to man, viz.: milk or water. But because I have to do this in the cases of certain men or women, I do not therefore infer that the whole community must wholly give up either of these articles. I know they are very necessary to mankind as a whole. A man *may* be able to smoke his two or three cigars, or chew daily as long as he lives. He may disgust other people by the habit, but he *may* not materially injure himself. Nay, there is no doubt that this wicked weed is, at times, of infinite value to man. For example, our soldiers fought the battles of the late civil war more easily in consequence of the almost universal use of tobacco. It supplies at times the want of food to the hungry, and often, I doubt not, solaced the sufferings of the wounded on the battle-field. But let the miserable condition of many who have used and are still using it inordinately, tell the tale of the evil resulting therefrom. "Give me the choice," said a physician of my acquaintance, who himself had once been a victim to intemperance in the use of tobacco, "give me the choice of which I should prefer for a son, the intemperate use of tobacco or of rum, and I should immediately say, 'let him be a drunkard. Rum is less hurtful than tobacco.'" I quote this as a victim's judgment, not as my own, though I have seen insanity produced, as I believe, by tobacco. Similar evil comes, in some instances, from tea,* coffee, and above all from opium, the use of which I regret to believe is increasing.

As a fitting termination of this part of my subject, I append the following list of various ales, wines and spirits, with the relative amounts of alcohol in each. It is taken chiefly from Brande's Chemistry.

* For intoxication caused by tea, see Appendix 14.

TABLE *showing the percentages of Alcohol in various Stimulating Drinks, Wines, &c.* (*Brande's Chemistry. Art., Alcohol.*)

Portuguese Wines.

Port,	contains 14.27 to 25.83	per ct.	of alcohol.
Bucella,	18.49	"	"

Spanish.

Sherry,	contains 13.98 to 23.86	"	"
Malaga,	17.26 to 18.94	"	"

Madeira and Canary Islands.

Madeira,	contains 14.09 to 24.42	"	"
Malmsey,	12.86 to 16.40	"	"

French.

Claret,	contains 12.91 to 17.11	"	"
" 1811, 1st growth,	7.72	"	"
" Chateau Latour,	7.78	"	"
" Vin ordinaire,	8.99	"	"
Champagne,	11.30 to 13.80	"	"
Burgundy,	12.16 to 16.60	"	"
Hermitage,	12.32 to 17.43	"	"
Sauterne,	14.22	"	"
Frontignan,	12.79	"	"

Sicilian and Italian.

Marsala,	contains 18.20 to 26.03	"	"
Lacryma,	19.70	"	"
Falernian,	18.99 to 20.00	"	"

German.

Hocheimer,	contains 8.88 to 14.37	"	"
Johannisberger,	8.71	"	"
Rüdesheimer,	6.90 to 12.22	"	"
Rhenish,	7.00 to 7.58	"	"

Cape.

Cape Madeira,	contains 18.11 to 22.94	"	"
Constantia,	14.50 to 19.75	"	"
Muscat,	18.25	"	"

Hungarian.

Tokay,	contains 9.88	"	"

Persian.

Sheraaz,	contains 12.95 to 19.80	"	"

British.

Grape,	contains	18.11	per ct.	of alcohol.
Raisin,		23.30 to 26.40	"	"
Currant,		20.55	"	"
Gooseberry,		11.84	"	"
Orange,		11.26	"	"
Elder,		8.79	"	"
Mead,		7.32	"	"
Cider,		5.21 to 9.87	"	"
Perry,		7.26	"	"

Malt Liquors.

Ale, Burton,	contains	8.88	"	"
" Edinburgh,		6.22	"	"
" London,		6.20	"	"
Brown Stout,		6.80	"	"
London Porter,		4.20	"	"
" Small Beer,		1.28	"	"
Edinburgh,		5.36 to 7.35	"	"

Spirituous Liquors.

Brandy,	contains	53.40	"	"
Rum,		53.68	"	"
Gin,		57.60	"	"
Scotch Whiskey,		54.32	"	"
Irish Whiskey,		53.90	"	"
American Whiskey, procured at Parker House, Boston (best),		50.00	"	"
American Whiskey, procured at Weeks & Potter's (real Bourbon, from Kentucky),		51.00	"	"
American Whiskey, worst of Michael Doherty's, with large deposits of extraneous matter,		44.50	"	"

*Lager Beer.**

Pfaff's, in Boston,	contains	5½	"	"
Second specimen,		6	"	"

The above American liquors and the lager beer were analyzed by Professor Wood, of the Harvard Medical School.

If the community follow the extremists of either side, a common standing spot can never be found. It is evident, if we can trust human testimony as given by our correspondents, beers and mild native wines should appear in a very different

* See Dr. Wigglesworth's Letter, Appendix 9, for further remarks on the above subject.

light before us from that which ardent spirits should hold. Cannot *Total Abstinence* advocates, therefore, as a present *Temperance measure*, permit the use of lager beer and of light wines, while all of their apparent but not real opponents, the *Temperance* advocates, should go to the utmost verge of moral suasion to check and finally banish, if that be possible, *ardent spirits* from the community.* Can there not be a union on this reasonable basis?

Will Total Abstinence ever prevail universally?

As I consider the love of stimulants a human instinct, which is seen wherever man lives, I cannot believe in the possibility of its suppression. It may be modified and regulated by the moral sense and by law when the gratification of that instinct interferes with the good order of society, but it cannot be by any means *extinguished*, prohibited. It rests upon a great cosmic law which cannot be annihilated by any puny effort of ours. The sun regulates that law as he regulates those of the seasons. We may modify its power and save ourselves by proper efforts from its effects, but the tendency will remain forever. In the presence of that really fearful law, all "Maine Laws" seem to me utterly powerless. But we in New England have not only this great climatic law to contend against, but we have also the influences of race and of a race educated to drunkenness by bad laws and by war. Therefore our task for the promotion of a real temperance is trebly difficult.†

* Mr. Druitt says, "Cheap wine would cut off the temptation to gin and with an equal bulk of water would be in many cases a happy substitute for tea. I know a great deal of the better class of needlewomen, milliners, and speak from experience" (Beckwith, above quoted, page 75). Again he says, "No one who has ever made the experiment will fail to give the preference to wine over spirits or can refuse to give a helping hand to any 'movement' that will send them fairly to their proper places as medicines for the sick and aged, and not as beverages for the healthy." "*Civilized*" (and I would add also as proved by our correspondence *uncivilized*) "man must drink, will drink; but it should be wine" (Beckwith, page 76).

† If we do not succeed in carrying out the principle of prohibition in Massachusetts it will not be the first unsuccessful attempt at legislation on liquor drinking made by the English race, as the following from Mr. Tovey fully proves: In the reign of Edward VI., a statute was passed called "An act to avoid excess of liquor." It declares that "none but those who can spend one hundred markes for yearly rent, etc., or be the son of a Duke, Marquis, Earl, Viscount or Baron shall have or keep more than ten gallons in his house." Second,—No tavern was allowed except in cities and only two in these except the larger ones, London having forty, the others less. Third,—No one was allowed to retail wine to be spent or drunk within the respective houses on pain of forfeiting £10 for such offence (page 43). († Quoted above.)

My position will be opposed by many. It will be denied that this is a human instinct, and in proof it may be said that some men and more women never during their whole lives use stimulants. Before admitting this argument, I must ask how many there are in the world who do not *use some stimulant*. There may be many who do not use alcoholic stimulants, but I suspect that there are but few, almost none, who "totally abstain" from *all* stimulants unless perchance it be some anchorite in his mountain cell who, from fanaticism, chooses to eat pulse and to drink water. I deem a love of stimulants as much a human instinct as any other of the so-called human instincts. And the proposition of total abstinence from stimulants, because intoxication prevails widely in the community, seems to me as preposterous as it would be to advise universal celibacy, because of the existence of gross evils in connection with those instincts that lead to the divine institution of marriage.

From the study I have made of our correspondence I am induced to believe that the permission to sell mild ales, beer, and light wines would, under certain very general rules, be really a promotion of temperance in New England, as it apparently is elsewhere. Should not therefore all friends of temperance, instead of endeavoring to bring about total abstinence, urge the general government to admit all mild "unfortified" European wines free of duty. They should urge the cultivation of the grape in this country. And upon this part of our subject permit me to refer to many details relative to American grape culture already given in a previous part of this communication.

NOTE.—While presenting this view I fully coincide with Dr. Anstie's remarks in his very important contribution made on this subject. They are in a work entitled "Uses of Wine in Health and Disease" (by Francis E. Anstie, M. D., of London. New York edition, Redfield, 1870.) "We would state our firm conviction that for youth (say under 25) whose bodily frame is not fully consolidated, the proper rule is *either no alcohol or very little indeed*" (page 18). Again: "Both temperance and economy most strongly argue that the bulk of the community should limit themselves to the class of natural wines produced under such conditions as enable the cheaper varieties to be relied on as sound, wholesome

and palatable" (page 36). And again: "It is among the class of natural wines averaging not more than ten per cent. of alcohol that we must seek the type of a universal alcoholic beverage for every-day life" (page 16).

How shall we treat the Drunkard?

I think that the drunkard has been treated at times with a great deal too much of false sentimentality. Every young man should be taught to feel that, in getting drunk, he violates one of the highest of social laws. He degrades himself lower than the brute, and should be treated, for the time being, as one lower than man. I would not, however, be vindictive, but would put forth a hand to support him when he rises. This I would do again and again if need be, until I was convinced that he was a real *dipsomaniac* — a man insane for drink. Then I would for a time deprive him of his liberty, and he should be placed in an inebriate asylum. In the present condition of our country, Massachusetts should have several inebriate asylums. Over these asylums should be put men wise and humane, but firm of purpose. Under that surveillance the victim should remain until he had gained sufficient moral power to enable him to govern his appetite. He must be cured of his disease as he would be of any malady in a public hospital. Upon this subject I cannot speak with the authority of one who has had experience, I therefore shall quote from a communication* sent by Dr. Day, late superintendent of the New York State Asylum for Inebriates, now at Greenwood, in this State.

Summary of the principal Subjects considered in this Letter.

First.—Stimulants are used everywhere, and, at times, abused by savage and by civilized man. Consequently, intoxication occurs all over the globe.

Second.—This love of stimulants is one of the strongest of human instincts. It cannot be annihilated, but may be regulated by reason, by conscience, by education, or by law when it encroaches on the rights of others.

Third.—Climatic law governs it. The tendency to indulge to intoxication being not only greater as we go from the heat of the equator towards the north, but the character of that intoxication becomes more violent.

* Appendix 1.

Fourth.—Owing to this cosmic law, intemperance is very rare near the equator. It is there a social crime, and a disgrace of the deepest dye. Licentiousness and gambling are small offences compared with it. To call a man a drunkard is the highest of insults. On the contrary, at the north of 50° it is very frequent, is less of a disgrace, is by no means a social crime.

Fifth.—Intemperance causes little or no crime toward the equator. It is the almost constant cause of crime either directly or indirectly at the north above 50°.

Sixth.—Intemperance is modified by race, as shown in the different tendencies to intoxication of different peoples.

Seventh.—Races are modified physically and morally by the kind of liquor they use, as proved by examination of the returns from Austria and Switzerland.

Eighth.—Beer, native light grape wines and ardent spirits, should not be classed together, for they produce very different effects on the individual and upon the race.

Ninth.—Light German beer and ale can be used even freely without any very apparent injury to the individual, or without causing intoxication. They contain very small percentages of alcohol (4 or 4.5 to 6.50 per cent.) Light grape wines, unfortified by an extra amount of alcohol, can be drunk less freely but without apparent injury to the race, and with exhilaration rather than drunkenness. Some writers think they do no harm but a real good if used moderately. They never produce the violent crazy drunkenness, so noticeable from the use of the ardent spirits of the North.

Ardent spirits, on the contrary, unless used very moderately, and with great temperance, and with the determination to omit them as soon as the occasion has passed for their use, are almost always injurious, if continued even moderately for any length of time, for they gradually encroach on the vital powers. If used immoderately, they cause a beastly narcotism which makes the victim regardless of all the amenities and even the decencies of life, or perhaps they render him furiously crazy, so that he may murder his best friend. While those who live in the tropics merely *sip* slowly ardent spirits from the tiniest of glasses, with the slightest appreciable effect, the denizen of

the frozen North swallows half tumblers full of the same to the speedy production of intoxication.

Tenth.—Races may be educated to evil by bad laws, or by the introduction of bad habits. England's taste for strong drinks has been fostered by legislation, and by wars of nearly two centuries since. France and parts of Switzerland are beginning to suffer from the introduction of absinthe and of schnapps. Especially is this noticeable since the late Franco-Prussian war. By classifying all liquors as equally injurious, and by endeavoring to further that idea in the community, are we not doing a real injury to the country by preventing a freer use of a mild lager beer, or of native grape wine instead of the ardent spirits to which our people are now so addicted?

Eleventh.—A race, when it emigrates, carries its habits with it, and, for a time at least, those habits may override all climatic law.

Twelfth.—England has thus overshadowed our *whole* country with its love of strong drinks, and with its habits of intoxication, as it has more recently covered Ceylon, parts of the East, and Australia.

Thirteenth.—This influence on our own country is greater now than it would have been if our forefathers, the early settlers, had cultivated the vine, which would have been practicable, as seen by the recent examples of Ohio and California, and from the fact that the whole of the United States lies in the region of the earth's surface suited to the grape culture.

Fourteenth.—If these early settlers had done this, our nation would probably have been more temperate, and a vast industry like that of France, of Spain and of Italy and Germany, in light native wines, would long ago have sprung up.

Fifteenth.—The example set by California and Ohio, should be followed by the whole country, where the vine can be grown. As a temperance measure it behooves every good citizen to promote that most desirable object. We should also allow the light, unfortified wines of Europe to be introduced free of duty instead of the large one now imposed. Instead of refusing the German lager beer, we should seek to have it introduced into the present "grog shops," and thus substitute a comparatively innoxious article for those potent liquors, which now bring disaster and death into so many families.

Sixteenth.—"Holly Tree" branches for the sale of good food, tea and coffee, cheaply to the people, should by the benevolent coöperation of the community, be made to take the places of the numerous grog shops now open for the sale of ardent spirits.

Seventeenth.—The moral sense of the community should be so aroused to the enormity of the evils flowing from keeping an open bar for the sale of ardent spirits, while those for the sale of light wines and of lager beer should not be opposed, except for the sale to habitual drunkards, after due notice from friends. Sellers violating such law might be compelled to support for a time the family of their victim.

Eighteenth.—The horrid nature of drunkenness should be impressed by every means in our power upon the moral sense of the people. The habitual drunkard should be punished, or if he be a *dipsomaniac*, he should be placed in an inebriate asylum for medical and moral treatment, until he has gained sufficient self-respect to enable him to overcome his love of drink. These asylums should be established by the State.

Nineteenth.—The appendix contains various letters on intemperance in this and other countries, on reciprocity treaties for introduction of European wines, &c.

In the sincere belief, gentlemen, that this analysis of our correspondence will, eventually at least, tend to help onward the most excellent cause of temperance everywhere, and in the hope that none will be offended at the expression, at times, of my own individual opinions, which in the course of the discussion I have deemed it my right and duty to give, I remain,

Your colleague and friend,

HENRY I. BOWDITCH.

APPENDIX:

CONTAINING ADDITIONAL CORRESPONDENCE TO THAT PUBLISHED IN THE SECOND REPORT OF THE BOARD, AND EXTRACTS FROM SUNDRY WORKS BEARING UPON THE SUBJECT.

[1.]

Prof. H. I. BOWDITCH, M. D.:

MY DEAR SIR:—The subject, to which you alluded in the brief conversation we had a few days since, is one which has occupied my attention for a number of years, and the more I investigate it the more complicated it appears as a social question. It is a fact that drunkenness is a disease only too common,—one from which our race has suffered almost from the beginning of its existence. In all ages political economists and philanthropists have sought a remedy, both from motives of economy and philanthropy. But it is only for the past few years comparatively, that men of learning have attempted an investigation from any scientific or philosophical standpoint. Good men have labored and prayed, while they were constantly lifting the warning voice; communities have been aroused and the most stringent laws have been enacted against the sale of intoxicating drinks; drunkenness has ever been branded as a crime *per se*, and yet the foulest deeds have constantly been committed, and the criminal records of all nations show, that the cause of a large percentage of offences that need to be punished by the strong arm of the law, are traceable to the inordinate use of intoxicating drinks.

Every community throughout the civilized world is suffering from the curse of drunkenness; for crime, pauperism, physical and mental debility are the natural fruits of intoxication. Such being the case, sober, reflective minds feel that the remedy must be sought for deeper than ever.

The time for itinerant lecturing by those who have only a superficial view of the subject, has passed away, and the disgusting style of mimicry and buffonery which used to caricature on the plat-

form the antics and vagaries of the poor diseased inebriate, has ceased to be popular. Reflective minds, especially in our State, are beginning to reason about the matter, and they soon find that the entire subject resolves itself into the following inquiries, to answer which in the most conclusive manner, men of science have been carrying on their investigations:—

What is the true pathological condition of the unfortunate class of men called inebriates?—and can any remedy be devised by which those men can be restored to lives of usefulness, and instead of being mere drones in the social hive, become actual helpers in the Commonwealth?

As to the first question, did I possess the ability to answer it satisfactorily to myself, the limits of this communication, which of necessity must be brief, would render it impossible. I can merely throw together a few thoughts rather as suggestions, or hints, and I shall not attempt a thorough discussion of the subject.

There are various forms of inebriety, as there are various forms of fevers and of other diseases. There is for instance what is called dipsomania, which generally manifests itself in periodical attacks. For several months the patient may be a total abstainer, and oftentimes the loudest and most enthusiastic in denouncing either the sellers or drinkers of intoxicants. He is evidently in earnest, and often whole communities may be roused through his instrumentality against what he well calls the *damning traffic*. Soon, however, a sudden change takes place, and he is found again wallowing in the mire of intemperance. If the question be asked of him how he thus disgraces himself, his answer will always be that he cannot tell, nor point to the primary steps which led him to take the first dram. It came about suddenly, and before he was aware of it he had fallen. Such men, when the spell is upon them, will sacrifice friends, property, and even life to gratify their passion for alcohol. I have known such individuals to walk twelve miles through deep snow to obtain alcoholic stimulants, and in more than one instance even the very snow through which they struggled has become their winding sheet. They will deprive themselves of everything, even selling their clothes to procure the poison they crave.

Now, sir, I contend that there must be in the case of those men a pathological condition which we have not yet fathomed. There must be deep in the human framework a form of disease which we should reach and remedy before we can expect a thorough cure in such cases. The disease is *molecular*, affecting the molecules and influencing the operations of the mind, thus rendering its manifes-

tions abnormal in different ways, of course, according to the habit and temperament of the individual. Some, for instance, are cruelly inclined, breathing out murder even against the innocent, while others are simply silly,—so generous that they will share their all with the first one they meet, or so pious that often unsophisticated persons really imagine that they mean what they say, and are truly the subject of religious influences. If even it is true that there is but one step from the sublime to the ridiculous it is especially the case with the dipsomaniac, who may to-day electrify by his earnestness for temperance while to-morrow he shall disgust by his maudlin talk while suffering from an attack. How can such cases be reached except through medical treatment in connection with wholesome influences? Another and perhaps a more numerous class of cases is what may be called the *asthenic* form. In this form the alcohol which is imbibed by the patient seems to have an affinity for the muscular system while the above-named class is more particularly affected in the nervous tissue. The patients in this case are more docile and good-natured while able to do anything, but they soon become helplessly drunk. At first the speech is affected, then the power of locomotion is lost, then follows a state of coma, during which the individual is quite insensible. After a while, he may arouse himself and move away, but only with the intention of procuring another drink.

Of course the two classes I have described may be subdivided into a number of varieties of which I have not time to speak now. I will simply say, in answer to my first inquiry, viz., Can anything be done for these unfortunates?—yes, most emphatically yes; and in my own practice I can point to numerous cases which have been thoroughly cured. True the process must be slow, from the very nature of the case, but a radical cure can be effected in most instances,—as often in fact as in any other disease of a psychological character. We have as yet never been able to use the requisite means for the proper treatment of such cases. I am aware that it is contemplated in this State to put in operation the means needed for that purpose, for our arrangements are now far from being satisfactory.

There should be one or more asylums for the treatment of these persons, situated away from business centres, where nature has been prolific in her gifts, where the "mind diseased" may find repose, where the corrupted body may be purified and made a medium for a higher, holier mental development.

I think it is the duty of the State to control the drunkard as it does the insane. I very much doubt, in most cases, whether persons thus afflicted can be cured, even with the best appliances in

less than one year. In looking over my record for the past fifteen years I find the men who have remained with me the longest have shown the best evidence of permanent cure. I have thus, Doctor, made a few brief statements, which I believe to be true, and if carried out in practice would result in great good to the unfortunate, and be in harmony with the civilization of the age.

I have the honor to be, Sir, very truly yours,

ALBERT DAY.

GREENWOOD, Nov. 1, 1871.

[2.]

QUINCY, Sept. 20, 1871.

DR. H. I. BOWDITCH:

MY DEAR SIR:—In your note of the second instant you inquire "if the fact of wine being made in California tends to drunkenness or otherwise."

Before the introduction of the native wines, when the stronger alcoholic stimulants were used, drunkenness was very common in California. The native wines are now found in nearly every household; they have supplanted to a great extent the use of the stronger alcoholic drinks. It is a fact which no one familiar with California for the last twenty years will deny, that drunkenness is much less common now than formerly. This change is undoubtedly due to the substitution of the mild wines of the country for the stronger alcoholic stimulants.

I think the annual report of the Hark-Away Association of San Francisco will furnish you the statistical information you desire.

Yours respectfully,

JAMES MORRISON.

[3.]

GILSEY HOUSE, NEW YORK, Sept. 20, 1871.

MY DEAR DOCTOR:—I am well assured from my own observation, that the introduction and general use of light wines have contributed to the lessening of intemperance in Ohio. On my return home, I will endeavor to procure such statistics as may be obtained, if any exist relative to arrests, etc. The subject is an interesting one, and for a long time engaged the attention of Mr.

Longworth in his lifetime, who believed he was aiding, most materially the cause of temperance, by his encouragement of the culture of the vine.

I am, very truly yours,

LARZ ANDERSON.

HENRY I. BOWDITCH, M. D., Boston.

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[4]

IPSWICH, Oct. 28, 1871.

MY DEAR DOCTOR:—I have taken from the records of the Essex House of Correction, the following tabular view of the commitments for ten years, showing the percentage of common drunkards for each year:—

YEARS.	Whole No. Committed.	Common Drunkards.	Per Cent.
1861,	402	107	24
1862,	395	94	24
1863,	415	121	29
1864,	207	48	23
1865,	174	27	15½
1866,	225	19	8½
1867,	177	18	10
1868,	261	39	14½
1869,	214	45	21
1870,	232	29	12½

Now it may be that this has little bearing on the subject of prohibition. But there are some coincidences that are interesting. Whether they bear the relation of cause and effect is worth considering.

We had the prohibitory law on the statute book up to 1868, when the legislature passed a license law. Previous to 1865 there had been no special effort to enforce the law. The legislature of that year (1865) passed the Act creating the State Police, who were especially to suppress grog shops, etc. Now, observe that in 1865 the per cent. of common drunkards drops from 23 to 15½. The next year when the force had come to understand better their work, the per cent. fell to 8½, and was only 1½ higher in 1867. The license law of 1868 finds our per cent. of common drunkards at the close of the year, 14½. Its effect naturally must run over to the next year, and the per cent. reaches 21.

The legislature of 1869 revived the prohibitory law exempting cider, and in 1870 further exempted porter, ale and lager beer.

The returns from our small institution go for little, unless similar results should prevail throughout the State. I have no figures at command, but I somewhat confidently expect that what is true of this institution will be found general, so far as the decrease of common drunkards is coincident with the establishment and work of the State police, and the increase with the working of the license law of 1868. I think Boston, probably Suffolk County entire, should be excepted. The liquor interest has had its own way comparatively there.

The deduction from this small horizon line is inevitably in favor of prohibition, even with the confessed imperfect enforcement of the law.

I should state that I have presented common drunkards only as being the best representative of this view of the subject. I have omitted entirely the commitments for simple drunkenness, which will average as many nearly as the common drunkards, and with little variation in the proportion.

Nor is this all that intemperance brings to us. An analysis of the circumstances and causes of all the catalogue of crimes which fill the prison, shows that intemperance is the cause of crime in a large majority of cases.

Every year 60 per cent. of all our commitments are directly traceable to drunkenness. Can the tide be stopped? Is the enforcement of the law alone to rid us of the monster? Were there only the pecuniary interest of the liquor traffic to meet, powerful as it is, the result would not be doubtful. But there are climatic influences, the universal desire for stimulants, the education of our civilization for some centuries, social customs and hereditary tendencies, all tending, in a greater or less degree, to perpetuate the evil.

I doubt not all this may seem to you, and in fact is, trite. You comprehend all the difficulties of the subject.

A visit to Chicago in 1868, and my observation there of the habits of the German population, first brought to my mind doubts that total abstinence will ever be an accomplished fact. I visited the beer gardens on Sunday, to see how the Germans spend the day. There was a band of music, a dance floor, rude seats and tables like our New England picnics in a beautiful grove, and *lager* in such quantities as I had never conceived. Everybody, old and young, drank and seemed to continue to drink during the afternoon. But lager was the only beverage,—no liquors, no drunken-

ness, and no fights, or disorderly conduct. The young men and maidens were merry and danced; the elders drank and talked with the gravity and dignity becoming to the respectable German citizen; the children sipped their mug of lager, and gambolled on the grass, and all went home apparently sober, to resume without doubt their usual avocations on the morrow. There were probably two thousand persons taking their weekly recreation. And this was only one of half a dozen similar places about the suburbs of the city. Now if this had been an American or Irish congregation, and the beverage the usual vile concoctions called whiskey, gin and brandy, would not the closing scenes of the afternoon have been very different? Broken heads, bloody noses, and the wayside strewn with the wrecks of humanity in beastly intoxication. I thought, if we could be rid of the grosser liquors — banish them — put them in the pale of dangerous drugs, to be only dispensed by the physician like other poisons, and substitute the lager of the Germans, and the light wines of France and California, should we not be doing our best to exterminate the curse of drunkenness?

I expect we shall yet come to this conclusion. The difficulty is that with the tastes of our people, lager and wines will be, indeed now are, a cover for the sale of the grosser liquors; and worse than all, these liquors are without exception adulterated or poisonous.

I have written, at your request, this somewhat crude statement of my present views, as briefly as possible.

Truly yours,

Y. G. Hurd.

Dr. H. I. Bowditch, Boston.

[5.]

Madrid, October 30th, 1871.

My Dear Doctor Bowditch:—About your inquiry relative to the introduction of Spanish ordinary wines into our country, the whole matter of the projected international convention to which you allude, passed by so completely so long since, that I am afraid the data I could give you now would not be worth much for your purpose. It never amounted to any formal negotiation as between the two governments. The Legation archives might show something on this subject if thoroughly ransacked, but if my memory is not at fault the two governments never committed themselves to anything like definite propositions on any side. I perfectly remember, however, the circumstances under which the informal

discussion of this idea arose and its course was in a few words as follows :—

It was when Spain was taxing the bread of the people of Cuba by a custom duty of eight (I think) dollars per barrel on American flour imported into Cuba, besides a discriminating duty against our shipping, by which all merchandize imported in our ships paid an extra percentage, over what it would have paid if imported in Spanish ships, whilst the Castilian flour paid only two dollars on its introduction into Havana.

We were pressing constantly for a reduction of these exorbitant duties upon our flour (as well as other articles) in Cuba, and the irritating discrimination against our shipping.

I did a good deal of good work in this direction, and it was a long time up-hill work, slow and apparently almost fruitless. At last, however, there were signs that considerable impression had been produced. Various leading senators and deputies came to me and in informal conversation exchanged their views with me, manifesting their willingness to reduce the Cuban, flour duties if a corresponding concession should be made to Spanish products in the United States, and it was distinctly said that the reduction of our wine duties on the cheap ordinary wines grown in Castile would be the most desirable, as it would tend to reconcile the landowners of Castile to the loss of the protective duties, favoring their flour in Cuba.

I had several conferences on this subject, and remember clearly the statements of the Marquis of Duero, President of the Senate, saying that the lands of Castile were better adapted to the cultivation of vineyards than of wheat, and that the opposition of the Castilians to the reduction of the Cuban flour duties could be overcome, by thus conceding a better market for their wines.

In my communications to Washington on this subject, I remember to have urged the same argument stated in your letter—that the introduction of cheap and sound wines into our country would be a salutary measure for the health of our people, and would tend to diminish the vice of drunkenness.

I trust it would be so to some extent and after some time. But I greatly fear that the vitiated taste of our people, accustomed to whiskey and rum, and other strong alcoholic drinks, would reject the pure juice of the grape as insipid or less agreeable to them. If they did not like cheap wine they would not drink it, and it might be found to result, in practice, that no people can be expected to confine itself to drinking cheap wines except it produces them. I suppose that, if we ever come to produce them, we shall drink them

also, and the taste for them will grow into our national habits, whilst the taste for rum and whiskey will grow out and decline.

But I doubt whether the efforts of the trader can hope to be so crowned. Trade depends on profits for its development, and a quick and constant demand for an article of merchandise is essential to build up the trade. I doubt whether the trade could build up the demand.

As regard the negotiations alluded to, no treaty was ever made. But continuing my efforts in the direction indicated we soon after did obtain (by Royal decree) the reduction of the Cuban flour duties, and the abolition of the discriminating duties, on the ground that it was not good policy for them to continue to irritate the Cubans, and throw them into sympathy with the United States by holding up to them constantly a barrel of flour worth six dollars at Key West, and fifteen dollars at Havana. Also, soon after, our war tariffs on wines, &c., made all idea of reduction on Castilian wines hopeless.

Yours ever faithfully,

HORATIO J. PERRY.

[6.]

24 CHARLES ST., November 9th, 1871.

MY DEAR DOCTOR:—Bastin in his "*Guide en Russie*," writes, "At the *fêtes*, champagne flows abundantly, and it was not without reason stated that the consumption of this wine in Russia exceeds that in any other country." "The common cheap drink is the bitter Kwass." "The immoderate use of brandy makes great ravages in the poor class, and, according to a report published by the best physicians, alcoholic liquors are one of the chief causes which now-a-days people the hospitals of St. Petersburg, and which have made so many victims." Walking out of Hotel de Bellevue, No. 58 Nevsky Prospect (the principal street) about midday, early in September, (and not a *fête* day) I counted eleven intoxicated people during a walk of six minutes, *i. e.* turning to the left I walked to the first bridge, crossing the street (three minutes distance) and back. I quote Bastin once more:—

"The national beverage is Kwass in St. Petersburg, also beer and brandy, the favorite drink of a people frequently indulging to excess, *like most northern nations*."

The trade in Crimean wines has increased within the last few years. The Russian drinks spirit also in his tea.

In Sweden at the restaurants cold meats and many varieties of spirit, Branntwein (flavored with anise, &c.) stand on the counter and are indulged in by the customer for a mere trifle before beginning a meal, at which he is expected to take wine, and which closes "*en regle*" with Swedish punch, a strong sirupy fluid, the use of which is spreading into other countries. The Branntwein is like the German Kümmel, and is so cheap that the means of intoxication are always at hand. Still the Swede, "the Frenchman of the North," is not so gross in his indulgence in liquor as the Russian. Wines, of course, in the northern countries, far from France or Spain, are somewhat expensive. The beer is much inferior to the German beer, and less drunk.

In Norway (according to Dr. Munroe) "the consul here says beer has existed for thirty years or more; also that drunkenness is now on the increase." It may have existed, but certainly beer was more seen by me, offered to me, and spoken of in my hearing during my visit in 1870, than during my visit in 1866. Where he gets his proof that drunkenness is increasing I do not know. I was less annoyed by inebriates on my second than on my first visit, and even if drunkenness is increasing it is probably due simply to the spirit drunk, for the beer is too thin and weak ever to produce such an effect. It is much weaker than German beer, whereas if it is to take the place of spirit it should be at least as strong as beer elsewhere. Increasing poverty and thinning of the population is more probably the real cause of increase in habits of intemperance. As a rule, the Norwegian is more temperate in his whole manner of life than the Russian. Corn brandy is used by the country people.

Very respectfully,

EDWARD WIGGLESWORTH, Jr.

[7.]

109 MT. VERNON ST., Nov. 18, 1871.

DR. BOWDITCH:

DEAR SIR:—In the summer of 1864 I spent a week in Gottenburg on the Swedish coast, and while there met a number of the inhabitants, both Swedish and English merchants. One evening the conversation turned upon drunkenness, the prevalent vice of Northern Europe, and they were unanimous in regard to the reform in this respect in Gottenburg, due to the introduction of cheap porter by Mr. Carnegie, a Scotch merchant and philanthropist.

Murray also alludes to this in his guide book. The distillation of strong liquors has diminished from 40,000,000 gallons in 1850 to 10,620,000 in 1861. It is but fair to say, however, that the American Encyclopedia attributes this to the increase of dissenters from the established church, and of temperance societies.

In 1865 I spent two months in Norway, travelling, and saw a great deal of drunkenness there, although beer is both cheap and abundant. Mr. Lootz, the Swedish and Norwegian counsel, says that this has always been the case in Bergen, his native city, and that the drinking of Fimkel, the corn brandy of the country, is still on the increase. It should be mentioned that the brandy is of course much cheaper in proportion than the beer.

Very truly yours,

W. F. MUNROE.

[8.]

FIFTH AVENUE HOTEL, NEW YORK, FRIDAY, Nov. 24, 1871.

MY DEAR SIR:—I regret that I have not found an earlier opportunity of collecting my thoughts with reference to our conversation of last Sunday evening, and now that I think the subject over, I fear my remarks will be of a somewhat fragmentary character, for it is now nearly three years since I travelled through our Australian and New Zealand colonies, and I am unable to refer to my diaries and papers, or any books on the subject. I would, first of all, draw your attention to some of the exceptional circumstances in connection with the bearing of native wines on drunkenness in Australia. The classes of people who at present form the chief population of New South Wales, have a large element of convictism in them, and the low tastes consequent thereon have not yet been eradicated; also a large mass of emigrants to that colony, as well as to the colonies of Victoria, South Australia, and Queensland, though not actually of the criminal class are but a few grades removed, for a man who fails in the struggle of life in England from drunkenness, is generally shipped off to Australia by his friends; this rule holding good from the highest to the lowest classes. You have therefore a mass of mankind to deal with of the lowest type. The climate nearly all the year round is hot, and *thirsty* weather prevails for ten months out of the twelve; therefore drinks of some kind must be had, and the prevailing intoxicating liquors are Holland gin and brandy of the worst description. When these cannot be obtained, tea, without milk, sweetened with coarse brown sugar is

the beverage, morning, noon, and night. A man may be so situated for nine months to two or three years that he can only obtain tea; he then comes to some of the towns, generally with money and drinks it all away, never stopping until his money is exhausted; and this it is which fills the lunatic asylums with those who have lost their reason through drunkenness. In the colony of Victoria are three large lunatic asylums built by the state at a cost of $725,000 dollars (£150,000), and I was informed by an officer high in the police service, that these asylums were largely filled by those who first suffered from delirium tremens, and then became insane. On this class, of what I should call hard drinkers, the larger cultivation of the vine would have no effect. They have always been accustomed to a strong, burning drink, and would consider native wine simply as so much water; but with the succeeding generation will grow up a taste for light wines, especially amongst the higher classes. The price of spirits and native wine is much the same, a drink of either being obtained from twelve to twenty-five cents. The demand for native wine is *largely* on the increase. Many wine growers told me in 1858 that their cellars of wine would be sold every year before the vintage had begun; the wine being drunk generally not more than one year old. I do not remember how long wine has been grown in Australia, but I think the first vineyards were established at Albany on the river Murray in New South Wales, and Victoria, about thirty years ago; it is, however, only within the last five or ten years that the demand has been sufficient to induce men to go into the vine cultivation, and I was informed that every year sees more land covered with vines, and greater pains taken with the production of the wine. In New South Wales and Victoria the wines are of the Bordeaux and Rhine description, and these are admirably suited to the climate. In South Australia a description of Spanish and Burgundy wine is produced, but these are chiefly sold for Tasmania, and the southern portion of New Zealand, where the climate is cold enough to admit of such heavy and generous wines being drunk. You will see by these remarks that the present is too early a period to judge of the effect of wine growing in Australia (no wine is made in New Zealand, and but little, if any, in Tasmania) on drunkenness in our colonies, the introduction of light wines being of too recent a date, and the present drinkers-to-excess being those who never have cared, and never would, for such a description of stimulating liquors. My idea is, that twenty-five years hence it will have had a marked effect in reducing drunkenness, and in improving the moral and physical health of our colonies.

Should you desire any other information, and will send me a list of questions I will try and answer them.

Believe me to remain, faithfully yours,

F. Jacomb Hood.

H. I. Bowditch, Esq., M. D., Boston.

[9.]

November 28th, 1871.

My Dear Doctor:—I looked up beer on getting home. Lager-bier is simply beer for storage,—from lager, a warehouse. It needs, therefore, to preserve it, a trifle more alcohol than beer which is to be drunk at once. The common Bavarian beer is a good type of lager-bier. This contains less than three per cent. of alcohol. In fact, lager-bier is so weak that most of the superior beers, even those for immediate drinking, are stronger than lager. Of these the best is Dreher's Klein Schwechater *Märzen* or March beer, in Vienna. So Bock-bier universally, (from Bock, a goat as butting everyone over who drinks it). And strongest of all, the Salvator bier of Munich brewed once a year.

"Gerhardt's Chimie Organique," Vol. II. p. 267, has a good article on beer. I quote from it.

Burton's ale, ...	8.88	per	cent.	of alcohol.
Brown stout, ...	6.80	"	"	"
London porter, ...	4.20	"	"	"
Small beer, ...	1.28	"	"	"
Augustiner double beer of Munich, .	3.6	"	"	"
Salvator bier, ...	4.2	"	"	"
Bock bier, ...	4	"	"	"
Common Bavarian beer, . . .	2.9	"	"	"

Thus while rum, gin, Scotch and Irish whiskeys, &c., contain fifty + per cent. of alcohol (fifty-three to fifty-four), ales never run up to nine per cent. and beers never run much above four and usually much less.

There is a good analysis of *German beers* in Liebig's and Kopps' annual report on chemistry for 1850 (Vol IV.), page 466.

In Pelouze and Fremy's Traité de Chimie, fifth vol., *i. e.* the second vol. of the Chimie Organique, page 467, there is a good article, "Beer = from 2–4 per cent. alcohol." Payen's Précis de Chimie Industrielle, Vol. II. p. 315, sets French beer at 4.5 per cent. Blox-

am's Chemistry, page 1491, "strong ales." Johnston's Chemistry of Common Life, first vol., p. 301, agrees with your views. Barret, D'Alcolization, per cent. of alcohol in wines, p. 247. Henderson's History of Wines, Rhine wine, p. 221. Mulder's Chemistry of Wines.

With highest respect,

EDWARD WIGGLESWORTH, Jr.

[10.]

MILTON HILL, Dec. 14, 1871.

MY DEAR SIR:—Our legislators have not as a body, it seems to me, given so much patient thought to the subject of temperance as it demands. In dealing with a matter may I not say of such infinite importance, because its relations seem to be almost infinite as affecting the welfare of the human race, everybody, and legislators in particular, should take into consideration climate, the effect of the sun, quality of the soil, and last but not least, race. Latitude has a good deal to do with temperance, and so has race. So far as my own experience — and I may safely say I have been no small traveller—goes, I am decidedly of the opinion that where light ales are used intemperance is a minimum quantity compared with those countries where are used rum, whiskey, brandy, Madeira and sherry, and in fact where any kinds of liquor in which the percentage of alcohol is large, are drunk.

I wish to call your attention for a moment to the islands of Porto Rico and Cuba, both of them islands of importance, and where the number of inhabitants is very large. Drunkenness in these islands is rare, but the use of wine is universal. The Spanish government, wisely I think, permit the free importation of the wines of Spain into those islands; and they are so cheap, costing the consumer for the common kind about five cents a bottle, and considered so wholesome that they are used by the poorest classes. Even the caleseros, exposed both night and day to sun and rain and late hours, use them freely at their meals, and I believe with good effects. I never saw a calesero drunk, or any the worse for his drinking.

Very truly yours,

E. H. FAUCON.

DR. HENRY I. BOWDITCH, 113 Boylston Street.

[11.]

In the Narrative of the United States Exploring Expedition by Commodore Charles Wilkes, U. S. N.*, we find the following ceremonial at the time of the making of the "*ava*" intoxicating drink and preparing it for the king of the Feejee Islands:

"Ava was chewing when Captain Hudson and his party entered. They were kindly received by the king who seated them near him. There is a peculiar ceremony used by these people in mixing their *ava*. It having been first chewed by several young persons, on the pouring in of the water they all raise a kind of howl. * * Those present were arranged in a semicircle, the chief operator being in the centre with an immense wooden bowl before him. The latter, immediately after the water is poured in, begins to strain the liquid through the woody fibres, and at the same time he sings. He is accompanied in his song by all present who likewise imitate all his motions with the upper part of their bodies while in a sitting posture. The motions keep time to the song. The king joined occasionally in the song, and when any important stage of the operations was arrived at the song ceased and a clapping of hands ensued. As each cup was filled to be served out, the ambati sitting near uttered the same wild howl as before. The first cup is filled from another, etc. * * * They are very particular to see that no one touches the king's cup except the cupbearer." Thus much we learn of the ceremonial of drinking the favorite stimulus of these islands.

In Vol. 5, page 98, Com. Wilkes in giving an account of the Kingsmill islanders, while he distinctly states that "they have no intoxicating drink," also describes a "toddy," karaca, procured from the cocoanut-tree. The twig on which the nut is growing is tied up and the fruit is prevented from ripening. The twig being then cut off, the juice, a species of liquid like molasses, flows out. This drink is used at feasts and dipped out of large bowls by means of cocoanuts or human skulls.

* Narrative, etc., by Charles Wilkes. New York: Putnam. Vol. 3, 115.

[12.]

Drinking Habits of Kamtschatka.

Dr. Lindley* (page 38) states that the following disgusting custom prevails simply for the intoxicating effects, produced by a variety of fungus, called Amanita Muscaria: "It is used by the inhabitants of North-eastern Asia, in the same manner as wine, brandy, arrack, opium, etc., are used by other nations." The plant at times grows plentifully; at others is scarcely found. It is dried and preserved. It is swallowed as a bolus or taken in infusions in soups etc. Mixed with certain berries *(vaccinum uliginosum)* its effects are like those of strong wine. It makes a man a merry fool or dead drunk. It excites muscular exertion, and it produces violent spasms or narcotism according to the dose. But the most peculiar effect and which shows to what extent men will go for the sake of a stimulus, is the following which I shall describe in the words of the author:—"It is said that from time immemorial the inhabitants have known that the fungus imparts an intoxicating quality to that secretion (the urine) which continues for a considerable time after taking it. For instance, a man moderately intoxicated to-day will by the next morning have slept himself sober, but, as is the custom, by taking a teacup of his urine he will be more powerfuly intoxicated than he was the preceding day. It is therefore not uncommon for confirmed drunkards to preserve their urine as a precious liquor against a scarcity of the fungus. The intoxicating quality of the urine is capable of being propagated, for every one who partakes it has his urine similarly affected. Thus, with a very few Amanitæ a party of drunkards may keep up their debauch for a week. Dr. Langsdorf mentions that by means of a second person taking the urine of the first, the third of the second, and so on, intoxication may be propagated through five individuals."

[13.]

Dr. Tyler, late Superintendent of the McLean Asylum for the Insane, states to me that from long experience, he is sure that the tendency of the climate of California is to produce an exhilaration and excitement rather than depression of the nervous system and

* The Vegetable: or the Structure, Classification and Uses of Plants, etc; by John Lindley, Ph. D., F. R. S., and L. S. 3d. ed., London: Bradbury & Evans, 1846.

that this is exactly the reverse of the English climate, which tends to a depression of the same.

This difference of climatic effects is so noticeable that Dr. Tyler has frequently seen persons coming from California with rather unbalanced minds, and they were always exhilarated, rarely if ever depressed, after arriving in New England. Such persons frequently get well here. On the contrary, a man depressed here will recover in California, whereas under the English climate the depression would be increased. Southern Europe has a more exhilarating effect.

Dr. Tyler has noticed these changes so often in his consultation experience that he feels very confident the effects are those of climate and not those produced by change of place and scene.

[14.]

A physician who has under his professional charge a large institution for the maintenance of aged persons, informs us that the demand among the inmates for stimulus in the form of tea is a matter of constant observation, and he moreover gives it as his opinion that from twenty to twenty-five per cent. of the whole number are *tea-sots*, drinking tea regularly from four to six times daily, and as much oftener as they can procure it. They show the effect of this over-stimulation by increased mental irritability, muscular tremors; also in a greater or less degree by sleeplessness.

The following fact has also come to our knowledge: A domestic in the family of a friend appeared at times intoxicated. As it was certain she could not get any of the so-called intoxicating liquors, great surprise was caused, until at length the problem was solved by the discovery that the individual drank large quantities of the strongest tea, of which she was constantly sipping.

[15.]

Since the presentation of this Report to the legislature, and consequently too late for publication this year the Board has received a very voluminous, interesting and valuable report on the subject of Intemperance in Sweden. The paper was prepared by Mr. Gyllenshiöld, the secretary of the National Temperance Society of Sweden, and chief of an important bureau in the Department of Justice, at the request of the American minister-resident, Hon. C. C. Andrews. It will be published next year.

THE ADULTERATIONS AND IMPURITIES OF FOOD.

By HENRY B. HILL,

ASSISTANT IN CHEMISTRY, HARVARD UNIVERSITY.

THE ADULTERATIONS AND IMPURITIES OF FOOD.

On the action of acid Fruits upon Tin Cans.

If an ordinary tin fruit-can be opened, and its inner surface examined, it will be found covered with the crystalline figures often produced by the action of dilute acids upon tin, and known as the *moirée métallique*. This apparent corrosion of the metallic surface suggests the possibility that an acid fruit if kept for a sufficient time in such a can, might take into solution an injurious quantity of metallic impurity. Cases of poisoning by salts of tin are rare, and yet they are known to act as irritant poisons. (Taylor, Medical Jurisprudence, *sub.* Tin.) Moreover, in the making and sealing of the cans, a greater or less amount of solder finds its way inside, and thus the fruit comes in contact with an alloy containing from 30 to 60 per cent. of lead.

The following investigation was undertaken to determine the nature of the metallic impurities introduced into acid fruits by the use of tin cans, and whether such impurities were sufficient to render the fruit unwholesome.

All the common fruits, the tomato, peach, plum, cherry, apple, pear, currant, etc., owe their acidity to the presence of malic acid or acid malates. (Rochleder, Phytochemie, *sub.* Lycopersicum esculentum, Amygdalus persica, etc.) Some of them contain, in addition, citric acid or acid citrates. The tomato and peach contain the malates or malic acid alone. If, therefore, tomatoes and peaches preserved in this way carry lead and tin into solution, the action of such fruits as contain citric acid in addition, if materially different, would naturally be greater. As, moreover, tomatoes and peaches are more generally sold than other fruit, they were chosen for examination. Several methods of analysis were tried, and the following finally adopted:—

The fruit was transferred from the can to a large beaker, water was added, and, after a thorough stirring, and maceration of the solid portion, the liquid was poured off through a small hair-sieve. The pulpy mass left on the sieve was again treated with water and strained, and the washing continued until the fruit had been treated with about eight times its weight of water. The turbid liquid thus obtained was next filtered with the aid of a Bunsen pump, in order to remove the suspended organic matter, and also to insure the removal of any small particles of solder which might be present. The clear filtrate was then evaporated upon a water bath, and in order to destroy the large amount of organic matter held in solution, pure nitric acid was added in considerable quantity to the thick sirup resulting from evaporation. The mixture was kept at a gentle heat in a covered beaker, until red fumes ceased to be evolved, when the whole was transferred to a small dish, the excess of acid driven off, and the heat gradually raised until the oxalic acid and the oxalates formed during the oxidation were decomposed. The white residue was then dissolved in dilute hydrochloric acid, the solution transferred to a platinum dish, and a piece of pure zinc added. When the evolution of hydrogen ceased, the inner surface of the dish was found covered with a delicate metallic film, which proved to consist of tin, lead and copper. For the detection of tin, the reaction of auric and mercuric chlorides upon stannous chloride was used; for lead the reaction with potassic iodide, and for copper, potassic ferrocyanide.

Five analyses of canned tomatoes were made, although the first three were made according to different methods, and one of canned peaches,—all with the same results. The nitric acid and zinc used, as also the distilled water, were especially tested for metallic impurities.

Attempts were also made to determine quantitatively the amounts of the various metals present, but the quantities were so minute that accurate separation and determination could hardly be effected. Of copper and lead in every case, I found but a trace; tin, however, was present in somewhat larger quantity.

The copper may come from the use of copper kettles used in cooking the fruit, or, its presence may be due to the fact that commercial tin often contains copper.

The Adulteration and Impurities of Vinegar.

Vinegar is sold at the shops chiefly as "cider vinegar" and "wine vinegar." The cider vinegar is almost universally made from cider, as its name implies. Wine vinegar, on the other hand, although occasionally made from wine, is much more commonly made, by the "quick vinegar process," from diluted alcohol. The common adulterations are water and sulphuric acid. Good vinegar should contain from three and a half to four per cent. of acetic acid, and when the amount falls much below this, water has probably been added.

In the examination of the various samples of vinegar purchased in Boston, or its vicinity, the specific gravity and percentage of acetic acid were determined, as well as the presence and amount of sulphuric acid, and accidental metallic impurities.

The percentage of acid present was determined with a standard alkaline solution, and as the color of vinegar interferes with the use of litmus solution, the point of neutrality was determined with delicate turmeric paper. The alkaline solution used was at first sodic hydrate; but a baryta solution was afterwards substituted for it, as its reaction upon turmeric is more delicate.

As vinegars occasionally contain sulphates, baric chloride may cause a precipitate in the absence of free sulphuric acid. The amount of sulphuric acid present as sulphate, is generally small. As determined by Hassal (Adulterations Detected, p. 402), the amounts in three different samples of pure wine vinegar were found to be 0.024, 0.025 and 0.019 per cent. Nevertheless, as sulphates may accidentally be present in larger quantities, especially in manufactured vinegars, the presence of free sulphuric acid must be established.

Very many methods have been proposed for determining the presence of free sulphuric acid; but when the percentage of free acid amounts to but a few tenths of one per cent. I found no method by which I was able to reach satisfactory results. It occurred to me, therefore, to take advantage of the fact that hydrochloric acid is set free upon the addition of baric chloride to sulphuric acid. About fifty cubic centimeters of the vinegar were taken and baric chloride added in excess. It was then distilled from a small flask with a good cooler, until the greater

part had passed over. The distillate was then tested with argentic nitrate, after the addition of a few drops of nitric acid. Pure vinegar, treated in this way, gave no reaction in the distillate for hydrochloric acid, but when 0.05 per cent. of sulphuric acid was previously added, the reaction was distinct and well marked. The addition of a considerable quantity of hydro-potassic tartrate gave a scarcely perceptible reaction.

The presence of acid sulphates would of course interfere with this test, but they can hardly be present in an unadulterated vinegar.

The results of the examination are given in the following table.

The specific gravities given are for 60° F. The second column gives the strength of the vinegar expressed in percentages of acetic acid. When sulphuric acid is present, the actual amount of acetic acid is of course less. The third column gives the percentage of sulphuric acid, and the fourth the reaction as above for free sulphuric acid.

	Specific Gravity.	Strength.	Sulphuric Acid.	Reaction of Argentic Nitrate on Distillate.
1, Cider Vinegar,	1.025	5.14	–	–
2, " "	1.007	4.43	–	–
3, " "	1.027	3.86	–	–
4, " "	1.016	3.75	–	–
5, " "	1.009	3 44	–	–
6, " "	1.015	3.20	–	–
7, " "	1.010	3.10	–	–
8, " "	1.016	2 99	0.12	Decided.
9, " "	1.008	2.94	–	–
10, " "	1.005	2 88	–	–
11, " "	1.016	2.78	*	–
12, " "	1 006	2 75	–	–
1, Wine Vinegar, bottled,	1.015	7.09	0.14	Decided.
2, " " "	1 018	6.84	0.40	Decided.
3, " " "	1.017	6 50	0.27	Decided.
4, " " "	1.018	6.31	0.14	Marked.
5, " " bulk,	1.008	5.14	0.09	Slight.
6, " " "	1.009	4.89	–	None.
7, " " "	1.009	4.79	0.06	Moderate.
8, " " "	1.006	4.30	0 12	Marked.
9, " " "	1.007	3.95	0.20	Marked.
10, " " "	1.008	4.30	–	None.

* Present but not determined.

The percentage of sulphuric acid was determined in four additional samples of wine vinegar as follows: I. 0.28, II. 0.20, III. 0.12, IV. 0.13. The first two gave a decided reaction for free sulphuric acid, and the last two a slight reaction.

It will be seen from the table that the adulteration of vinegar with sulphuric acid is common, especially in the wine vinegars.

Two samples of vinegar were found to contain lead, and in both instances it came from the leaden faucet for drawing it from the cask.

The first sample contained 0.09 per cent. of metallic lead, and the second 0.52 per cent. This latter percentage corresponds to 144 grains of plumbic acetate to the quart, or 4.5 grains to the fluid ounce. Too much cannot be said in condemnation of the criminal carelessness through which such poison was sold.

The determinations of sulphuric acid and lead were made by my friend, Mr. Charles E. Munroe, assistant in the laboratory at Cambridge.

The Adulteration of Coffee.

The microscope gives the readiest, if not the only practicable means for the determination of the adulterations of coffee. The different physical properties of ground coffee and of the ordinary adulterations, however, give the means for determining with tolerable certainty the presence or absence of adulterating substances without the aid of the microscope.

Genuine ground coffee, whether it be course or fine, contains very little dust, and even the finest portions feel sharp and angular. Adulterated coffee on the other hand, usually contains a large proportion of dust which is soft and smooth to the touch.

If a teaspoonful of genuine ground coffee be thrown into a tumblerful of cold water, it will float upon the surface of the water, while the substances usually used in adulterating coffees will sink under the same circumstances. If, when the suspected coffee is thrown upon cold water, part sinks at once, the sample is quite sure to be adulterated.

The results of a microscopical examination of coffees purchased in Boston and its vicinity, are given below. In every case the dust, and the portions which sank and floated when

the coffee was thrown into cold water, were separately examined, and sections were made of such fragments as seemed from their fracture, color, or hardness, to be foreign.

Seventeen samples were examined. Of these ten were of coffees sold in bulk, and seven were of cheaper coffees sold in packages of one pound each.

Of the ten samples of the first class, not one was found adulterated.

Of the seven samples of the second sort, one contained no coffee at all; two contained very little coffee; four contained from 50 to 70 per cent. of coffee; seven contained roasted peas or beans; six contained roasted grain, chiefly wheat, and two contained also chicory. These mixtures were labelled "Java and Mocha," "Java and Rio," "French breakfast coffee," "English breakfast coffee," "Java coffee," and so on, although in no case were they sold to me as anything but mixtures containing coffee.

PROPER PROVISION FOR THE INSANE.

By Edward Jarvis, M. D.

PROPER PROVISION FOR THE INSANE.

All human Powers given for Development and Use.

All our manifold organs and faculties are given to us for use. The development, power and action of each are needful, not only for its own health, but for that of others. The constitutional force includes and depends upon the fulness of the health and strength of each organ, function, faculty or element of our nature.

The World the field for Human Culture.

The open, broad, living world, is the appropriate field for men's growth and labor. Its opportunities and duties, its responsibilities and influences, are given to us for these purposes. With its intercourse and coöperation, its sympathies and encouragements, with its attritions and mutual corrections, talent, mental and moral power are developed and strengthened and shaped for their destined ends. In this open field, and by these aids and correctives, every element of humanity may be stimulated to healthy growth and restrained from overgrowth. Here men, on the one hand, are encouraged and almost compelled to put forth all their force; and, on the other, to repress their tendency to waywardness or oddity, and correct their errors of thought and emotion, and thus they may complete and harmonize their elements of character, and make of themselves a perfect wholeness of manhood.

Evil effect of separate or solitary Life.

This is shown, not only in the successful results of each endeavor and life in the world, but also in the issue of experiments of training and living in narrower and exclusive social fields. The attempts, by design or by accident, in connection

with limited purposes, to live separately from the world, or from any of its healthful influences, end in incompleteness of character. The residents in monasteries and convents, the members of societies set apart from the great and comprehensive social fabric, recluses, hermits, persons or families, that live alone and remote from others, without intercourse with men and women at large, even households, or large collections of either sex exclusively,—all of these have a less complete development and balance of character. They are less perfect men and women, and have eccentricities and peculiarities more frequently than those who associate with the general mass of the people, and take part and lot in their interests, trials and successes.

Effect of mutual Intercourse and Assistance.

Association with the world at large, in its manifold forms, tends to wear off the excrescences, and suppress the peculiarities and eccentricities of people, to give them a rounded and harmonious character, and to develop and establish those habits of thought, notions of life and appropriateness of judgment, that the world ever demands and loves to encourage in its members. This is what is usually called common sense, and what we call mental health—sanity.

As the elements of life are unceasingly renewed, and we repeat ourselves from day to day, we stand continually in need of the same corrective influences, the same mould of broad society which first shaped our minds, to prevent any undue weakness or growth, any deficiency or excess of any part, the production of excrescences, and to preserve the due proportions of a well-balanced character.

Dangers of the World may be escaped.

Although the world has power to do this good, and ordinarily does so much for its several members, yet it has also power to do evil. It offers temptations to excesses, stimulations to morbid developments and growths, to peculiarities, and sometimes fails to keep the better elements alive and strong. Thus its influence may at times disturb and distract, and produce moral and mental disorder; but these are exceptions to its usual healthy action, and the occasions of their morbid

influence are to be guarded against and avoided, while the general, the greater and necessary good is to be sought, and turned to the profit of mental health and power.

The greatest and wisest teacher, while praying that his friends might have the fullest strength and perfection of character, asked, not that they should be taken from the world, but merely that they might be saved from its evil. Recognizing that the world was the true field of human growth, strengthening and usefulness, he desired that they should there live, and there engage in the ordinary social duties and participate in the usual social enjoyments, and thereby do the largest work for others, and gain for themselves the highest happiness and develop the most generous virtues, and yet be defended from injury. While he would warn and guard his friends from falling into dangerous places, he would give them unlimited opportunity of life and action in all others.

Action needful for Health of all the Powers.

Action is the natural condition not only of our whole being, but of all our individual elements. The organs and their functions, all the powers and faculties, physical, mental and moral, the appetites, passions and propensities, each and all in their several ways and under appropriate discipline, require action, in order that each may develop and retain its own strength, and contribute its due proportion to the fulness and perfection of the total life, to the establishment of the constitution and the formation of the character.

Action to be suspended in Disease.

But whenever any organ or power is diseased or disturbed, the first requisite is suspension of action as far as possible, to relieve it of its burden of labor, and give it opportunity to rest and regain its health. If this rest cannot be obtained without restraint, we apply force, as in the case of a broken limb, to prevent injurious action.

Suspension of action limited to necessity.

Yet this restraint is, as far as possible, limited to the organ or power that is disordered, while the others, that are strong and healthy, are permitted to perform their natural functions.

This restraint is limited not only to the part or power that is diseased or weakened, but to the lowest degree that is needful to prevent increase of disturbance and to secure recovery.

Usually, rest of the part injured or organ diseased is necessary for the reparation or cure. Some require only rest for these purposes, and to some even this is not needful. The judicious surgeon therefore, when called to treat a case of injury of foot, ankle, leg, or other part, first cautiously inquires whether action needs to be suspended, and if so, in what manner and to what degree. He asks first, whether mere quiescence is sufficient, if not, then whether it be needful to apply more restraint by means of a bandage, or must he add to this the starch bandage or wooden splint, or use the box to enforce complete rest. Still further, he inquires whether any other part of the power needs to be kept at rest.

In all this process of examination and judgment, he keeps in mind, both the necessities of the suffering limb and healthy requirements of the whole, and governs his suspension of action and the restraint by these considerations.

If the patient can move about, use his other limbs or organs, attend to business, or enjoy life, without detriment to the injured part, or impeding the healing process, he is encouraged to do so, and thus the recuperation is accomplished with as little cost of discomfort or loss of time as possible.

Dyspepsia and other Diseases.

On the same principle we treat other injuries and diseases of the body. In case of dyspepsia, the first question that presents itself is, what change in the habits is needful for restoration of health, and how far it is proper to interfere, by the intervention of remedies. With some, it is only necessary to change the diet. Sometimes a single article of food acts as a disturbing cause. The stomach may be not only unable to digest the offending matter, but it may be so disturbed by its presence as to be unable to digest whatever is eaten with it. In this case, the suspension of the disturbing cause is generally sufficient to allow the stomach to recover its ordinary power in regard to other kinds of food. More frequently several articles and sometimes the whole diet must be changed, and an entirely new system adopted. If this be insufficient, other measures,

medication, etc., must be used. But in all cases the mildest remedy and the least interference are first considered, and each proposed increase is weighed, and its efficacy compared with the difficulty to be overcome, until such measure is reached as seems to promise to produce the desired result, and relieve the patient.

Insanity not an Identity.

That class of diseases of the brain which we include in the term insanity, like the class of diseases which we include in the term dyspepsia, is not an identity. Neither of these affections is a single morbid state or condition, still less is that condition in all cases the same.

As among men, the original mental and moral elements vary very greatly in their individual force, and still more in their combinations, and as they are exposed to manifold and various disturbing causes, so their derangements and new complications must be equally various and present results of mental disorder of which it is rare that two are alike.

Thus the whole range of insanity includes numberless and diverse conditions and manifestations, from the furious maniac, the dangerous homicide, down to the gentle, harmless, timid melancholic, who is fearful of injury from every circumstance, and shrinks from all intercourse with society and friends. And there are all intermediate grades and combinations of grades between these extremes.

Varied Insanity to be treated variously.

As in the management of dyspepsia, so in the management of mental disorder. Every plan of treatment must recognize this diversity of the disease, and be founded upon, and shaped according to, the especial condition and wants of the patient under consideration.

Insane to be separated from Causes of the Disease.

The first matter to be considered is the cause or causes of the mental disturbance, and to relieve the patient from their influence, either by removing him from them or by neutralizing their power.

As food is the natural stimulus of the digestive organs, so

are ideas, thoughts, emotions the natural stimulus of the brain. As when the stomach is disordered and the food is found to be the disturbing cause, the rational course is to change the diet, in such a manner and to such an extent, as the case seems to require,—so, when the brain is disordered, the influences that act upon it for evil are to be changed.

In a very large part of the cases of mental disorder the causes are in, or are associated with, the persons, scenes and interests of home or business with which the patient is or has been connected. Sometimes the home or business may be so modified that the disturbing cause, if it be there, shall be removed or neutralized.

Some may be restored at Home.

A lady, in a family of great discipline and discretion, was troubled with delusions, and fell into acute dementia. She imagined that the evil spirit controlled her and prevented her free action. She was three hours in dressing, and as long in eating any meal, and a heavy torpor rested on all her movements of body or mind. The appropriate changes were made in the family. The influences were regulated so as to meet the patient's necessities. In a few weeks she regained her natural activity, the delusions disappeared, and now, for more than ten years, she has had no return of the malady. This is a single example; but others might be quoted of insanity being cured without the removal of the patient from home.

This class is small. The homes of few can be so modified and regulated that the lunatic can be there retained with a chance of restoration; most, nearly all, must go away. The question then arises, where shall they go?

Shall they travel?

Shall they take abode in ordinary families elsewhere? If so, shall it be with friends? With strangers? Shall they be placed under the special charge of a physician competent to treat them? Or must they go to a hospital to find the proper treatment for their malady?

Some need Separation only.

Some cases of lunacy are due to a single cause, presence or influence, and only need separation from it to recover. Some

are insane only in connection with a single person, scene, circumstance or interest. Some women have delusions in respect to their husbands, and some men in respect to their wives, while in respect to all other persons or topics they are sound. In the presence of their partners, and when they are the subject of their thought or conversation, they are insane and talk wildly: but in company with others, and upon other subjects, they seem to think and certainly talk and act rationally. Some are disturbed, in the same manner, by their families, or by other persons, some by their business, some by certain plans or pursuits or studies, but have their reason in apparently full measure, when these are out of sight and out of mind.

Except in regard to the special subject of their delusion, or when excited by its presence, they seem to have rational possession of their faculties, and talk, reason, understand and appreciate ideas and sentiments, and hold fitting relations to those about them. They can manage their affairs, work, associate with the world, or some parts of it, and enjoy most of the common personal and social blessings, and contribute a good share to the comfort and advantage of others.

Some of these need only separation from these disturbing causes to overcome their susceptibility to these evil influences. They only need to go away from home, business or other sources of irritation, to regain their mental health. Among several cases of this kind, I quote a lady naturally cheerful and well-balanced, and an excellent housekeeper. She became depressed, anxious about her domestic affairs, peevish, irritable and very troublesome to herself and the family. Finding that, when away from home, her husband, children and servants, she manifested her usual amiability and self-discipline, I advised that she go to the country and stay with a friend, of whom she was fond, until she should regain her mental strength and self-control. She did so, under only general supervision, for four months, during which she manifested none of her morbid feelings, and then she returned to her home. She had no mental disturbance through the remaining eight or ten years of her life, but discharged her duties of an amiable, affectionate and disciplined housekeeper as she did before her illness.

A man doing a large and successful business, with no derangement of his affairs, was overburdened by the heavy respon-

sibilities of the great interests and the anxieties of financial matters. He began to be fearful, and to worry. He lost power of concentration, would not attend to the common concerns, which he had managed correctly. He became depressed, was overcome with his doubts, and refused to go to his place of business or attend to any of his affairs when presented to him.

As I learned from his partners there was no real cause of disturbance; that the affairs were sufficiently prosperous; that the weight and complications of the business had overborne him, I sent him to the country to remain with a brother, where he could hear nothing of finance or trade. In a few weeks he regained his mental balance, his wonted cheerfulness and confidence. He returned to his business, and has given his usual attention to the affairs for the last five years, and has had no depression in that time.

Another case was a widow, who was suddenly left with a sufficient fortune, consisting of buildings, houses, stores and shops. Although she had sons and daughters in mature life, of excellent character, who were always ready to take charge of her business, she undertook to manage all her own affairs herself. She attended to the tenants, collected the rents, oversaw the repairs, paid the taxes, and kept all the accounts, persistently refusing the assistance of her devoted and competent children.

In course of two or three years, her mind gave way; she became suspicious of every one, especially of her children; she refused to trust them with any responsibility or care, saying they would defraud her. She became irritable, fearful of poverty and exceedingly penurious. She made her family suffer from want of sufficient food.

I advised her to give up all care of her property, and put it in the hands of a suitable agent, and go to another town and live with a brother, in whom she had great confidence. She did as I advised. In her new residence, apart from the disturbing associations, she regained her natural cheerfulness and trusting spirit, and at the end of about a year, returned to her old house, in her former health. But she did not resume the charge of her property. This was some years ago. Since her recovery she has been and is now pleasant, hopeful and confiding, and entirely without mental disturbance.

These are examples of a considerable class of patients who

need only separation from disturbing causes for their restoration.

Some need Separation and Supervision.

Some others require supervision to regulate their conduct and the influences that bear upon them, and with their aid, they may live, in ordinary well-disciplined, discreet and affectionate families and there recover.

A wealthy lady of high culture, in another State, became suspicious and depressed. She refused to go to church, at which she had previously been a constant attendant. She refused to visit her friends, or see them when they called upon her, to go to the stores, and even to drive or walk in the streets, and at last to eat at the table in her own family. She gave up her favorite pursuits,—music, painting, drawing and reading. She shut herself up in her chamber, because she thought and said that every one was laughing at her, talking about her, and making up wry faces at her.

She was then brought to my care. She was placed in an amiable and cultivated family, where she was treated with great tenderness and sympathy, and where I could see her daily. A favorite relative, a lady of similar taste and culture, came and lived with her.

Her suspiciousness soon began to yield. She associated with the family, sat with them at the table and in the parlor. She walked, rode, and visited the neighbors with them, and at length became an agreeable companion, as in health. Her natural tastes revived. She began to play on the piano and sing, and to take interest in books, magazines and papers. She went to concerts, operas, and theatres. She visited picture galleries, took lessons in drawing, and always went to church. Thus her mind and feelings regained their natural tone, and at the end of fourteen months she went back to her home, and since that time, about six years, has had no return of her depressions or suspiciousness.

Without appearing to interfere, I had control of all the influence that reached her, and directed all her movements; and she lived, as she supposed, a lady of her culture and taste would prefer.

In the course of more than thirty years of observation of

mental diseases, many patients have been managed with similar limited interference. Some were in my own family; some in the neighboring families, and few at their own homes. Most of them recovered under various degrees of repression and of strictness of guardianship; yet all in the ordinary domestic circle and in common dwellings, mixing more or less in society, taking some part and interest in the world and its affairs, and encouraged to practise their ordinary habits, and indulge their natural tastes, and exercise their undisturbed faculties so far as their maladies allowed, but always under supervision that watched over and controlled, in a measure, the circumstances that surrounded them and the influences that bore upon them.

Self-Limited Mental Diseases.

Professional experience and confidence have admitted many diseases into the self-limited class, in which no medication nor interference accelerates the cure. They only need separation from the disturbing causes and to rest, in order to allow their malady opportunity to pass through its natural and necessary stages. They need also to be watched to prevent any coincident derangement from aggravating the main disorder.

This is pathologically true in regard to some mental diseases. If cases of this class are not violent, but mild and manageable; if these patients have no delusions, nor morbid susceptibilities in respect to the people and matters about them; if they are in pleasant and discreet families, who can and will treat them properly, and suffer no injudicious interference and no evil influence to reach them, they need not go away from home.

Two cases within my observation illustrate this principle. Both of these were members of wealthy, kind, discreet families. Both were subject to periodical returns of insanity. Each of these, in the early attack, was sent to my care and recovered in my family, one in seven months and the other in three months, and then returned to their homes. There they enjoyed good mental health for several years.

Afterward, each of these ladies had a recurrence of the malady, and again their friends applied to me to receive them into my house. But as I had then ceased to take patients, they were both retained at their homes, where everything was arranged to suit their wants. They both recovered in about

the same time that had before been required in their previous attacks.

Various Provision needed for varied Forms of Insanity.

Although I have been consulted in regard to, and requested to take charge of, all sorts of cases, I have only taken such as could be managed in a private house, and controlled by personal influence. I sent the others, the excitable and unmanageable, to hospitals. But since I have ceased to take immediate charge of any patients, I have yet been and am now called upon to give direction to many as to their future course for treatment and recovery.

Difficulty of finding means of treating the milder Cases.

Among these applicants there is a wide variety of pathological conditions, and an equally varied susceptibility of influence, and necessity of a corresponding difference of treatment with every degree of freedom and restraint.

Looking at this diversity, I have endeavored to put these patients in the way of receiving that kind and degree of influence, direction, medication and restraint which their several cases seemed to require. Some were left at their homes, some travelled, some went to the houses of friends or strangers, some to live in physicians' families, and many to the several hospitals suited to their conditions.

With the last I have found no difficulty, for there are plenty of good institutions for such as need their care. But for those who could as well, and as favorably for their recovery, live elsewhere, there is frequently a doubt, and for most, an insuperable obstacle in the difficulty in finding proper families that are willing to take a wayward or uncertain inmate into their fold, and the inability of most patients to pay the reasonable and necessary cost.

An insane person, however mild and yielding, is, in one or more of his elements, out of harmony with the rest of the world. On these points he is morbidly sensitive, susceptible of disturbance, and sometimes irritable. He is therefore to be treated with invariable consideration and tenderness; his peculiarities and his weaker points are never to be forgotten, nor touched with carelessness or disrespect. Every one that is

brought in contact with him, the family with whom he dwells, the visitors, the neighbors whom he meets, must all be on their guard, lest they unwittingly disturb him. The conversation everywhere, in parlor, at the table, in the street, and every matter presented to his attention, every influence must be cautiously weighed and regulated with the same view.

If the patient require more than this negative non-interference in a well-regulated, good-tempered family, he must find it in the care of a suitable physician who can give time and attention to his management.

It is a great sacrifice for any family, however disciplined, discreet and kind, to hold themselves and all their elements, constant and casual, under such watchfulness and restraint. If they admit an inmate whose condition requires this of them, they must do it for charity or gain, some great love for the patient, or the expectation of large pecuniary reward.

Few patients can find, among their friends, families that have this moral and mental discipline, and the power and the heart to make this sacrifice. Few have the means to pay the proper cost of this private care, whether in the family of a physician skilled in and accustomed to treat insanity, or in any other, where the needful moral and mental qualities only are to be found. Consequently, the only resort for a great majority even of mild patients is the hospital.

Hospitals.

Here comes the natural question, whether the hospital, as now constructed, is adapted to the various conditions and wants of all classes of patients.

Ancient Notions and Treatment of Insanity.

In ancient times, when superstition and fear held precedence of science and diagnosis, insanity, in the world's eye, represented wickedness, and lunatics were believed to be the devil's possession. In such cases the pathology was self-evident, the indications equally clear, and the method of treatment seemed manifest to all, both wise and simple,—for the patient, either as a sufferer, must be rescued from the control of his demoniac possessor by the intervention of supernatural agency, or as a sinner or criminal, he must be treated with such punishment as

his case seemed to demand. But, as the first, the supernatural and miraculous means of healing was not at man's command, the last, the punitory method, became the rule, which was, through centuries, adopted by the world.

Sometimes, according to the rude notions of the period, the triple purposes of religion, medicine and justice were combined in the treatment of lunacy. In the middle ages, when the monasteries were, in a manner, hospitals, to which the sick resorted for care or relief, the Franciscans had especial charge of the insane. In one of their establishments, some of these severe disciplinarians applied to their lunatic patients the same rule of chastening that they did to themselves, and gave to each one ten lashes a day.

Through the long ages, until modern times, the world looked with trembling fear upon insanity. They considered it dangerous and untrustworthy, and defended themselves, in the best manner that they could, from the harm that it might inflict, not upon the patient himself, but upon others.

These sufferers were bound with straps, handcuffs, leg-locks, shackles and fetters; they were confined in cages, in strong-rooms and in prisons, for the good, not of themselves, but of sound, strong, but fearful people at large. This method of treatment was in very general operation in the last and the preceding generations, and it has not even now gone entirely out of use.

Modern Lunatic Hospitals.

The lunatic hospital, as it now presents itself, as a curative institution, is modern. It is within the memory of the older people now living when the first was opened, and now there are fifty-eight of these houses of healing and charity in the United States, and several more are in process of construction.

It was a great advance in humanity and science to provide these houses for the insane, where most of them,—a very large majority,—if sent early, may be restored to health. It was a great and beneficent struggle to persuade the people to send their deranged friends to their care.

Hospitals need farther Improvements.

Now, having taken this great and satisfactory step in the management of insanity, for which all honor be rendered to the

fathers who dared to lead the way, it seems that the time demands that another step be taken in the same direction.

Hospital Architecture.

We cannot fail to see that, in devising the plan of the modern lunatic hospital, the psychological architects have not forgotten that they are providing for a dangerous element of humanity,—that some of these patients are destructive, and others are disposed to break their bonds and escape,—and that many people suppose that most, and some fear that all of the insane belong to one or the other of these two classes. Assuming that caution is the first element of wisdom, they deem it safe, at least, to combine security with charity, and give an assurance that the patient shall do the world no harm, while they prepare the means of doing him the greatest possible good. So, while the hospitals are provided with all the internal arrangements,—rooms, wards, beds, furniture, etc.,—for the comfort and healing of the inmates within, they are also built with thick and impenetrable walls, windows grated with strong bars or inflexible rods, and heavy and strong doors, invariably locked.

Still holding to the idea that what one lunatic is, all may be, —if some are untrustworthy, and can be retained only by force or strength of barriers, others may have the same restless desire to escape,—the architect seems to consider it best to provide for the least and possible danger as well as the greatest and the manifest. Hence the building throughout, the side for males and the side for females, the wings for the violent and those for the gentle, the rooms for the dangerous man, even the criminal maniac, and those for the timid, trusting, child-like girl or elderly lady, all are built alike, externally strong.

Public Architecture.

Architectural ambition has sometimes been a stumbling-block in the way of improvement in the management of the insane. The external too often takes precedence of the internal in the plan. Some approved style of architecture—Grecian, Byzantine, Gothic, Elizabethan—is adopted, and must be followed with such proportions, harmony of parts, grace, ornamentation, as to present one unimpeachable whole, a magnificent front, that

will impress itself favorably on the spectator, and appear well in photograph and engraving.

The public eye is more familiar with, and a better judge of the outward form than of the inward fitness. Cultivated taste is more fastidious and exacting than utilitarianism. The inconveniences of a bad arrangement of kitchen and stairway, of office and lodging room, are out of sight and may be forgiven; but the disproportion of outward wall, the want of harmony of parts, centre and wings, the misplacement of portico, column and pilaster, the violation of the accepted rule or model, are manifest and must not be tolerated.

A graceful and grand public building is the pride of the neighborhood. It is pointed out to, and remembered by, strangers, and so is known abroad. It gives an honorable reputation to the town and State. It gratifies the ambition of the projectors, the dignitaries and the people, while the inner conveniences, the facility of accomplishing the purposes of the structure, the comfort of the inmates may be overlooked or made to yield to the outward beauty and dignity.

The lunatic hospital has not always escaped this architectural danger. The shell, the encasement of the house being first determined, the manner of distributing the inner parts into wards, rooms, &c., follows. Household accommodations, dormitories, dining-rooms, passages, stairways, must be arranged according to the capacity of the inclosing wall, and then if this arrangement be such as to facilitate the business that is to be done within, if it be convenient for the workers, if the rooms, whose operations are offensive to each other, are wide apart, and those whose purposes are closely allied are in juxtaposition, it is sometimes due to good fortune rather than to original design.

The hospital is usually a single building, with many wings extending to the right and left, and backward, in equal proportion on both sides. One side is for the males and the other for the females, but both are alike in structure, in strength of wall, in iron-barred windows. There are several halls or wards, and some private rooms for each sex. These, too, are alike for both sexes.

Some of these wards are more airy and cheerful than others, for the various forms of disease, but the securities of grate and lock, the means of external repression are on one indiscriminate

plan for all, however widely they may differ in their necessities or their dangers.

Although within the hospital there is a variety in the social arrangements, and the patients are classified according to the character of their disease, the violent, the mild, the demented are severally in their separate wards, yet they, the gentle and the furious, are placed all alike within these forbidding walls and in these secure rooms, beyond which they cannot pass.

Although in these strong buildings the patients are governed with the greatest wisdom, managed with the highest skill that the profession produces, and treated by all, both officers and attendants, with the best discretion, tenderness and respect, yet there is a want of opportunities of freer life, of the exercise of the faculties that are not diseased, of participating in such of the common enjoyments as many of the patients can partake of, without detriment to their health or impairing their chances of restoration.

Hospital Architecture needs Variety.

The question now arises whether hospitals cannot be so arranged as to meet the varied wants, capacities and liabilities of the inmates; whether they may not provide and offer the comfortable, home-like accommodations for the mild and the trustworthy, as well as the securities for the dangerous, and all the intermediate grades of strength and pleasant convenience for the intermediate grades of mental disorder.

Self-Respect of the Insane.

There are few elements of our nature that we cherish with more fondness and tenacity than our self-respect, and few things that we desire more than the confidence and respect of others. There are few things that grieve, mortify or disturb us more than distrust and suspicion. These are natural elements; they belong to all men in health; they are variously affected by insanity; they are extinguished or suspended in very few lunatics, but in most they remain active; in a large proportion they are little diminished, and in some they are exalted and intensified. In all, they should be treated with tenderness, and carefully pre-

served in healthy action, and should be used as one of the available means of restoration.

The insane, like other people, are apt to respond, in feeling and manner, to the kind of treatment which they receive. If trusted and if confided in, they will generally be more ready to endeavor to be trustworthy; but if suspected and if confidence be withheld, they lose that motive to deserve it. Yet all the patients, of every variety of character and tendency, are practically told, by the bars before the window and the lock on the door, that they are suspected of a determination to run away, and cannot be trusted. They are pained and depressed, perhaps irritable, and the government of the hospital loses this opportunity of gaining the sympathy and confidence of, and of establishing influence and power over the trustworthy, which a more generous and confiding manner of lodging might have secured.

A different arrangement would obviate this difficulty. Instead of one uniform plan of construction in every part, with the same means of confinement for all, in a single building, there should be separate buildings, differing in structure and character, according to the necessities of the various classes of patients. While some may be strong as the whole is now, for the untrustworthy and violent, others should be built in the form and manner of ordinary dwellings, with generous, confiding and unbarred windows and doors such as the patients have been accustomed to in health. Then the internal arrangements of rooms, furniture, &c., should correspond, and all present the outward appearance and inward character of a home. This is sufficient for the treatment of a considerable class of the insane, who, whatever may be their delusions on some subjects, are yet capable of appreciating and enjoying most, if not all the conditions of domestic life.

Architecture of Private Asylums.

Most of the private lunatic asylums of England, in which more than half of the paying patients of the kingdom are kept, are of this character. Many of them were built for and previously occupied as gentlemen's seats, which in all respects, internally and externally, in wall, window, room, furniture, resemble common dwellings of various classes and sizes.

Such are the structure and character of the houses, in which, for more than twenty-five years, I have treated patients of this class, in my own and my neighbor's families. Among all these, there have been no windows broken, and only one instance of an attempt to escape, through the window of a ground-floor room.

Wooden Sashes in Windows of some of English Asylums.

Some of the large new public asylums and the additions to some of the old asylums of England have the common wooden sashes of ordinary private dwellings in all their windows. But in the rooms, where the violent and excitable are placed, there are wooden shutters or strong wire network, on the inside of the windows.

Some parts of Hospitals should resemble Private Dwellings.

Moreover, as everything should be arranged to keep in the patient's mind feelings of home as much, and to remind him of the hospital as little as possible, these dwellings for the mild should be not only separate from, but out of sight of, the stronger and more forbidding house, which might call out their painful sympathies, or be an ever-present warning to them of their liability to change for the worse, and a standing threat, that if their disease should take an unfortunate turn, and they become excited, they must be removed to that place of stricter confinement.

Even the names by which the houses are designated have an influence on the tender sensibilities of the patients. They should not be called by any term that signifies a hospital or any of its parts, but by names that are used elsewhere for common dwellings, and have pleasant associations connected with them. They should be called *houses* or *places*, and if necessary to designate them more particularly, some term appropriate to their position or circumstance, as grove house, if near a grove, elm house, valley house, orchard house, &c.

Between these extremes, the larger house, with suitable means of security for the violent, and the simplest dwellings for the mildest and the trustworthy, there should be intermediate other buildings, with various grades of strength and grace, with the appropriate means of repression and guardianship, of comfort

and freedom, which the intermediate classes of patients may need or can profitably enjoy.

In all of these the confinement and liberty can be measured in accordance with the condition of each patient. No chance is offered for the violent to injure, or for the untrustworthy to escape. No healthy power is restrained, and all have the opportunity to enjoy such of the comforts and graces of ordinary life as their maladies permit; and no part of the treatment interferes with the healing process.

Diversified Parts of the Hospital.

If the way is not clear for the erection of separate houses, for the different classes of the insane, in one establishment, and one building must be for all, the object may yet be attained, in great measure, at least, by having the several parts of this building varied in structure and character to suit the various conditions of the different classes of patients.

The architectural plan should not present one solid building, uniform in all its parts, but an apparent collection of houses, united together, yet diversified in appearance, character and purpose, like a row of houses of varied architecture and appearance in a city street. Some of these parts should be, as they now are, and others should be arranged, windowed and furnished like the different and separate houses already described, wherein the several classes of patients may have all the appropriate varieties of treatment, of security and indulgence, that their cases require.

Distrust of Hospitals.

There is in the community, both the sane and the insane, a frequent aversion to the hospital, and an unwillingness in some to submit their deranged relatives or be submitted to its restraints and close confinement. Most physicians hear of this at times. I hear it often from the families who apply to me to receive one of their number into my house, or to give direction as to the disposal of their disordered relatives. They seek for any means of cure or guardianship, private medical cure, residence in private families, travel, even empirical practice, rather than send to a public institution.

This varied character of the hospital would overthrow these

objections in the minds of many, and draw to its fold some for whom other means of cure are sought, and others for whom none are sought for want of means to pay the necessary cost, and who are consequently retained at their homes as long as they can be endured, too often, until the day of healing is past, and then they are sent to the hospital for custody through their remaining years.

It would be a great boon to such patients as these to place the advantages of the hospital within their reach, and draw them to it in the early stages of their malady. It is true the hospital is legally open to them now, and they are, in terms, invited to come and enjoy it. But this is not in such a manner as commands their confidence, and so long as they have not the living faith that will carry them to these institutions, they lose this opportunity of being healed. Practically it is all the same to them, whether they are kept from the hospital by being locked out, or by the fear of being locked in, so it be that they do not enter. And the removal of the obstacle, whatever it may be, whether real or imaginary, will give them a real blessing, in this their only opportunity of returning to a life of sanity and usefulness.

It would be a boon to a large portion of the milder patients, now and hereafter to be in the hospitals, to be allowed to be under the faithful care and skilful treatment that now protects and heals them, and yet suffer no needless pain and mortification, and no unnecessary circumscription of their remaining enjoyments.

It is not proposed here to adopt the system of Gheel, with its many good elements and its great deficiencies and cruel abuses; nor the cottage system of Scotland, with its incompleteness; nor even that of Clermont, however excellent in much of its plan and operation; yet the power and the virtue that belong to them are not to be overlooked. We need a combination of these with the more stringent plan and management of hospitals here and elsewhere now adopted. We want a diversification of buildings or of parts of one building, according to the condition of the different classes of patients, providing as much restriction as the violent and untrustworthy need, and offering as much freedom as they and all others can safely and profitably enjoy.



THE USE AND ABUSE OF OPIUM.

By F. E. Oliver, M. D.

THE USE AND ABUSE OF OPIUM.

The well-attested fact of the increased and increasing consumption of opium in the United States, during the past few years, has suggested the inquiry whether, and to what extent, the so-called opium habit can be traced among our own inhabitants, and to what causes it may fairly be attributed. If it be true that this practice, so long an endemic in Eastern and Southern Asia, has appeared among us, and, according to a recent and careful observer, is rapidly gaining ground "in a ratio very considerably increasing as every successive year arrives," it is not too soon to look about us and see how far it has intruded upon our soil, that we may be the better prepared to meet, if need be, so insidious a foe. It is obvious, in an investigation of this nature, with the limited opportunity at command, that to reach more than an approximative result would be difficult, if not impossible. Many important sources of information are carefully guarded, and the habit is so unobtrusive as often to pass unnoticed by the casual observer, the professional eye alone detecting the secret in the haggard countenance, or in some maniacal propensity characteristic of the opium eater. It will not be surprising, therefore, if the statistics thus far obtained, although suggestive, seem meagre, and in many respects unsatisfactory.

The following are the questions addressed to the physicians throughout the State :—

1st. Are preparations of opium used by the people except for the relief of pain ?

2d. We would like to know whether the injurious use of opium has increased of late years, and, if so, the causes of such increase ?

Before referring to the replies to these questions, it may be well to glance for a moment at a few facts which bear

indirectly upon this subject. Opium eating, or *opophagia*, as it has been sometimes incorrectly termed, viewed as a national habit, may be reckoned, says a recent writer,* to have "taken its departure" from about 1840. Previous to this time the supply of opium does not seem to have been beyond its legitimate demand. Since that date, however, the annual importations have increased from 24,000 pounds in that year to 154,841 pounds in 1870, this not including that subsequently exported. During the present year, the importations for the first six months have been at the still greater rate of about 246,000 pounds, exclusive of that exported, † or nearly ten times the quantity imported thirty years ago, the population having, in that time, somewhat more than doubled. Making all due allowance for the importation of smoking opium, which for the fiscal year ending June 30, 1871, was not far from 37,000 pounds, we still have, if we add that not included in the customs returns, an amount, at the lowest estimate, considerably above that already given. From the opinions of druggists of Boston and New York, and others informed on the subject, which are, however, more or less conjectural, it has been estimated that the amount of opium and its preparations regularly prescribed is not proportionally larger than formerly, and that thirty per cent. of that imported would cover all such prescriptions, as well as that used in the composition of the various nostrums. If we add to this, however, twenty per cent., we still have fifty per cent. unaccounted for, and which it may not be unreasonably supposed is used for other than its legitimate purpose.

In our endeavors to ascertain the extent to which opium eating prevails in Massachusetts, we regret that we are unable to present fuller returns. Less than one-half of those addressed have been heard from, these representing but a little more than one-third of the State.

Of the one hundred and twenty-five physicians from whom replies have been received, forty report, in answer to the first question, that they know of no case of opium eating. The remaining eighty-five state that opium is used to a greater or less extent in their respective circuits. In many of the smaller towns

* Calkins on Opium and the Opium Appetite.

† U. S. Report on Commerce and Navigation.

where the habit exists, the number of those addicted to it is reported as nearly as could be ascertained. In the returns from others, the terms "few," "many" and "several" are alone given, and in still others the number is altogether omitted. From such uncertain data, it would, of course, be impossible to arrive at anything like an accurate computation. The number in the towns where it is given varies from one to twelve, the latter being the largest reported in any one. In the larger towns,—as Boston, Charlestown, Worcester and New Bedford,—the number is necessarily much larger. On inquiry among the druggists of Boston, we learn that their experience is various, there being those who have little call for the drug, and who make it a rule never to sell it without a written prescription; while others have many regular customers. One druggist states that, although he never sells it without a physician's order, he has, on an average, five or six applications for it daily, in some one of its forms. Two other prominent druggists have each six habitual purchasers. Several report one or two. Much seems to depend on locality. In the more public streets, and in parts of the city where those addicted to the habit mostly reside, the sales are much larger.

In Worcester, one druggist reports that "opium is used to an alarming extent in that community."

In Charlestown, inquiry was made at all the eighteen druggists' shops. Of these, "eleven have at present no regular customers; one never sells, except on prescription; the remaining six report sales to regular purchasers of opium, as follows:—each shop has an average of two, the largest number to any one being four."

In Chicopee, the druggists report that they have a great many regular customers. Many others in various parts of the State speak of the habit as quite prevalent. A prominent druggist of Boston states that "the sales of opium preparations to the country trade is out of all proportion to those of other drugs."

From these statements the inference is unavoidable that the opium habit is more or less prevalent in many parts of the State; and, although it may be impossible to estimate it, the number addicted to the drug must be very considerable. The number of opium eaters in the United States, says a late

anonymous writer,* has been computed, from the testimony of druggists in all parts of the country, as well as from other sources, to be not less than from eighty to one hundred thousand. How far Massachusetts contributes toward her numerical quota, must, for the present, be a matter of conjecture.

The daily amounts of opium reported as taken vary with the habit and idiosyncrasy of the taker. Few even approach De Quincey, whose daily laudanum potations amounted to more than half a pint, equivalent to about three hundred and twenty grains of the gum.

In the town of Athol, of twelve opium eaters reported, "one person takes an ounce of laudanum daily; another, nine ounces weekly; another, two ounces monthly; two take one drachm of sulphate of morphia each, weekly; two take half that quantity in the same time; and two take a drachm of this salt each, monthly; one takes one ounce of opium, and one twice this quantity every month."

In Charlestown, the largest monthly sale of the sulphate of morphia is ten drachms; the average to each of five is eight drachms monthly; of laudanum, two persons are reported who each buy thirty ounces per month; one buys eight ounces of crude opium in the same time; one uses about one ounce of opium monthly; and two others two ounces each.

In Leyden, one person is reported who takes one drachm of the sulphate of morphia weekly.

In Shrewsbury, "of seven habitual opium eaters, one drachm of the sulphate of morphia, weekly, is the largest amount used."

In Shirley, one drachm of the sulphate of morphia is taken, by the one opium eater reported, in three weeks.

In Swampscott, one person is reported who takes two ounces of laudanum daily.

In Boston, one druggist sells to a customer one ounce of laudanum daily,—two ounces being ordered on Saturday.

It will be noted that the largest quantity of crude opium taken was eight ounces per month, or about one hundred and twenty-eight grains daily. The largest reported daily amount of laudanum was one ounce. The largest monthly sale of the sulphate of morphia was ten drachms, at the rate of one-third of a drachm daily, and equivalent to not far from one hundred

* The Opium Habit.

grains of the gum. A Boston druggist informs us that not long since, an habitual customer bought a drachm of the sulphate of morphia, one-half of which he took on the spot, and, on the following day, having disposed of the remainder, called for a draught containing an ounce and a half each of laudanum and brandy. No apparent effect followed the dose referred to.

The question as to the increase "in the injurious use of opium," and the causes of such increase, where this exists, seems to have received but partial attention. Of the eighty-five correspondents above mentioned, thirty-nine make no allusion to this inquiry. Twelve are of the opinion that the habit is decidedly on the increase, twenty-eight, that it is not increasing, and six, that it is diminishing, in their respective districts. These opinions, not always based upon very accurate observation, must be taken for what they are worth. The more general opinion among the best informed druggists throughout the State is that the habit is increasing.*

The following extract from a communication received from one of the State Assayers, Mr. S. Dana Hayes, will be found of especial interest in this connection :—

"In reply to your inquiries, it is my opinion that the consumption of opium in Massachusetts and New England is increasing more rapidly in proportion than the population. There are so many channels through which the drug may be brought into the State, that I suppose it would be almost impossible to determine how much foreign opium is used here; but it may easily be shown that the home production increases every year. Opium has been recently made from white poppies, cultivated for the purpose, in Vermont, New Hampshire and Connecticut, the annual production being estimated by hundreds of pounds, and this has generally been absorbed in the communities where it is made. It has also been brought here from Florida and Louisiana, while comparatively large quantities are regularly sent east from California and Arizona, where its cultivation is becoming an important branch of industry, ten acres of poppies being said to yield, in Arizona, twelve hundred pounds of opium. This domestic opium is often improperly manufactured in the form of expressed juice from the whole poppy plant, including the stems, leaves and flowers, instead of the exuded sap

* This increase in the use of opium seems the more remarkable when we remember the extent to which, as we are told, chloral, chloroform and ether are now taken in our community, especially among women, for purposes of stimulation and sedation.

obtained by scarifying the capsules of the plant. It is generally deficient in morphia, and is sold in balls of sticky paste, covered with green leaves, or as a semi-fluid, like thick-boiled molasses, in boxes. That which is not used where it is produced, including the shipments from California and the West, together with inferior and damaged parcels of foreign opium received and condemned at this port, is sent to Philadelphia, where it is converted into morphia and its salts, and is thus distributed through the country.

"Opium and morphia are not only freely used in patent and *commercial* medicines, but they have now become common ingredients in many family remedies, which were formerly made at home from simple herbs and roots,—such as cough mixtures, tooth washes, lotions, liniments, enemas, poultices, healing tinctures and decoctions. Opium is consumed in the form of pills often made by very unskilful hands, and it has been found in alcoholic liquors, especially in the brandy which was sold publicly in one of the western towns of this State.

"Among the most dangerous preparations of morphia are those now prescribed and sold by uneducated or villainous individuals as so-called 'cures' for persons afflicted with the uncontrollable appetite for opium—'Relief for the Opium Eater'—; and the very existence of such nostrums certainly indicates the extent of the disease. One of these preparations consisted of a clear solution of sulphate of morphia, colored pinkish by aniline fuschine, and sweetened; the directions accompanying it were not very definite, but a dose containing about two grains of sulphate of morphia was to be taken three times a day, 'if necessary,' by the patient, when suffering badly from depression and other symptoms.

"I need only refer to the frequency of wilful and accidental poisoning and narcotization by morphia or opium, as you are familiar with such cases; but they are certainly increasing every year in this State."

Among the proximate causes of the opium habit, that which owes its origin to the opiate treatment of certain nervous and other chronic affections, especially of the bowels, is perhaps the more common. The prolonged use of the drug in such cases, too often without medical sanction, places the patient in the greatest jeopardy; for the appetite, once acquired, is with the greatest difficulty controlled. A late writer, who says of himself that he "had eaten much more than half a hundred weight of opium, equivalent to more than a hogshead of laudanum, and had used it uninterruptedly for fifteen years, was first induced

to take it for a disordered condition of the digestive organs;" and it will be remembered that it was for an attack of neuralgia that De Quincey first sought the druggist's shop.

In the extracts from the letters of our correspondents given below, it will be noticed that frequent mention is made of this habit, as caused by the injudicious and often unnecessary prescription of opium by the physician. So grave a statement, and one so generally endorsed, should not be allowed to pass unnoticed by those who, as guardians of the public health, are in no small measure responsible for the moral, as well as physical, welfare of their patients.

It is unnecessary here to do more than allude to the other physical causes that occasionally lead to excess in the use of opium, dependent upon a depressed condition of the nervous system, induced either by occupation, overwork with deficient nutrition; or by a vicious mode of life, as prostitution, and, sometimes, intemperance. Those more generally exempt from this vice are out-of-door laborers, and others whose occupations allow an abundance of fresh air and nourishing food, with regular hours of sleep. A deficiency in these natural stimuli, so essential to sound health, promotes a desire for artificial substitutes, and opium, where others are unavailable, is often resorted to. In England, and we suspect the same would be found true, although to a less extent, in our own country, the opium habit is especially common among the manufacturing classes, who are too apt to live regardless of all hygienic laws. The taste for opium eating among soldiers retired from the army is alluded to by a few of our correspondents. It seems also to have been noticed in England, and is probably due to the habit acquired in the service, or to shattered health, the result of campaign exposure.

The fact generally remarked that women constitute so large a proportion of opium takers, is due, perhaps, more to moral than to physical causes. Doomed, often, to a life of disappointment, and, it may be, of physical and mental inaction, and in the smaller and more remote towns, not unfrequently, to utter seclusion, deprived of all wholesome social diversion, it is not strange that nervous depression, with all its concomitant evils, should sometimes follow,—opium being discreetly selected as the safest and most agreeable remedy.

We must not omit, however, one other most important cause of this habit referred to by our correspondents, and the most general one of all that predispose to it. We allude to the simple desire for stimulation,—in the words of another, "that innate propensity of mankind to supply some grateful means of promoting the flow of agreeable thoughts, of emboldening the spirit to perform deeds of daring, or of steeping in forgetfulness the sense of daily sorrows."* No climate and no soil is without some product of its own which furnishes, at man's bidding, a stimulating ingredient to meet this universal want. In an age, too, like our own, of unprecedented mental and physical activity, the constant over-exercise of all the faculties, together with the cares and perplexities incident to a condition of incessant unrest, create a keener appetite for some sort of stimulus. No clearer confirmation of the truth of this statement is needed than the present enormous consumption of alcohol and tobacco, as well as of those milder stimulants, tea and coffee, for which there is an ever-increasing demand.

The selection of opium in preference to other stimulants, due more often to a taste, natural or acquired, is sometimes prompted, as appears in our reports, by motives of expediency—the facility, perhaps, with which it can be procured and taken without endangering the reputation for sobriety. In one town mentioned, it was thought "more genteel" than alcohol.

The question how far the prohibition of alcoholic liquors has led to the substitution of opium, we do not propose to consider. It is a significant fact, however, that both in England and in this country, the total abstinence movement was almost immediately followed by an increased consumption of opium. In the five years after this movement began in England, the annual importations of this drug had more than doubled; and it was between 1840 and 1850, soon after teetotalism had become a fixed fact, that our own importations of opium swelled, says Dr. Calkins, in the ratio of 3.5 to 1, and when prices had become enhanced by fifty per cent.† "The habit of opium chewing," says Dr. Stillé, "has become very prevalent in the British Islands, especially since the use of alcoholic drinks has been to

* Stillé's Therapeutics and Materia Medica.

† Opium and the Opium Appetite.

so great an extent abandoned, under the influence of the fashion introduced by total abstinence societies, founded upon mere social expediency, and not upon that religious authority which enjoins temperance in all things, whether eating or drinking, whether in alcohol or in opium." And, in other countries, we find that where the heat of the climate or religious enactments restrict the use of alcohol, the inhabitants are led to seek stimulation in the use of opium. Morewood, also, in his comprehensive History of Inebriating Liquors, states that the general use of opium and other exhilarating substances, among the Mahometans, may date its origin from the mandate of the Prophet forbidding wine. These statements accord with the observations of several of our correspondents, who attribute the increasing use of opium to the difficulty of obtaining alcoholic drinks. It is a curious and interesting fact, on the other hand, that in Turkey, while the use of wine of late years has increased, that of opium has as certainly declined.

We had almost omitted to mention one source of the opium appetite, more than once referred to by our correspondents: we allude to the taste implanted in infancy and childhood by nursery medication. When it is remembered that nearly all the various soothing sirups contain this drug, or some one of its preparations, in greater or less proportion, it will not be surprising that such a result should sometimes follow.

The following extracts from the letters of our correspondents contain replies and the question as to the increase, and the causes of increase where they exist, of the opium habit in Massachusetts:—

Ayer.—"Those addicted to opium are all females; and most of them contracted the habit from the use of physicians' prescriptions during sickness."

Belchertown.—"A few cases among the lower classes, where it is resorted to as a stimulant."

Barre.—"Yes. Primarily by medical advice for relief of pain; and then suffered to relapse into confirmed opium eaters, I think through the fault of their medical advisers."

Chilmark.—"Five cases reported, originating in opiate prescriptions."

Clarksburg.—"I think it on the increase, because doctors pre-

scribe it more indiscriminately now than formerly, thus establishing the habit with the patients."

Concord.—"There are a few instances in which opiates are injuriously used. In every case that has come under my observation, it has resulted from the use of intoxicating liquors, and as a substitute for them."

Dedham.—"Several nervous women take opium here."

Eastham.—"I think the use of opium has slightly increased, mostly among females."

Everett.—"I am of the opinion that the use of opium has increased of late years, it being considered more 'genteel' than alcohol."

Fairhaven.—"Opium is used without medical advice and not for the relief of pain. The use has increased of late years. Man naturally requires, or thinks he requires, stimulants of some sort. People live very differently from the way they should; food, labor, exposure to changes of weather, insufficiency of clothing, these affect the system physically and morally in so many ways, that longings are produced for something to make them feel more comfortable; opium will do it and is used."

Granby.—"Two cases reported, originating medically."

Hadley.—"Opium is used otherwise than by advice, and the habit is increasing. It seems to me that the general tendency to use some stimulant has an influence. The use of opium as a stimulant is becoming better known, and the restraint of an adverse public opinion is less felt."

Hinsdale.—"There are probably half a dozen opium eaters here, all females but one; the habit was originally contracted in these cases by means of the opiate treatment of neuralgia."

Leverett.—"One opium eater in town—a woman—who first took the drug for the relief of pain.

Newburyport.—"I think the use of opium and its preparations is confined to elderly people. The young and middle-aged are more addicted to tobacco."

North Andover.—"We have a few people who use opium as a stimulant."

Shrewsbury.—"Of seven habitual opium eaters within my observation, five began the use by medical prescription, and were unable to leave it off. All are persons past the middle age, and all have used the drug many years."

Swampscott.—"The use of opium in its various forms has materially increased within the last ten years. It is used, in many cases, in place of rum. I know of one person who takes two

ounces of laudanum daily, as a substitute for alcoholic stimulants, and attends to his business regularly."

Stoneham.—"Preparations of opium are used by a certain portion of the population for purposes of stimulus and sedation, without medical advice. I think that the practice has increased of late years, and that the cause mainly consists in overwork; the ease with which opium can be procured, and the facility of administration without leaving work, contributing to its selection."

Truro.—"A number of persons in town who have continued the use of opium, which was given in the first instance to relieve pain."

Uxbridge.—"One case cited of habitual opium eating, originating in the opiate treatment of neuralgia."

Warwick.—The preparations of opium are not extensively used. I think that in most towns the abuse has increased, arising from the too free employment of opium in chronic diseases."

Westfield.—"I have reason to believe this practice exceedingly common among certain classes of people who crave the effects of a stimulant, but will not risk their reputation for temperance by taking alcoholic beverages."

Watertown.—"I know of very few opium eaters, and the number is not increasing. The sub-cutaneous use of morphia tends strongly to reëstablish the habit."

Upton.—"Preparations of opium are used in a few cases, commenced when suffering from severe and continuous pain, and followed until the habit became fixed."

Worcester.—Information has been collected by our correspondent from several practitioners, as follows:—

"I have talked with some of our most intelligent apothecaries, who tell me that the use of opium is greatly increased, especially among women. The reasons which one gave are these: The doctors are prescribing it more to their patients, and thus the habit is acquired. There is also the desire for some form of stimulant. Alcoholic stimulants being prohibited, many have resorted to the use of opium."

"Opium eating is undoubtedly very common in this community, but whether on the increase I have no means of knowing."

"Druggists tell me that they sell a great deal more opium and morphia to the people than they used to, and that it is used by women and others, who could not take alcoholic liquors without publicity. I recognize no more misuse of these drugs than formerly."

"Another gave it as his opinion that 'the use of opium in its

various preparations is increasing among the people as a stimulant, and is now being used to an alarming extent. I believe this to be due largely to the unpopularity and restricted use of alcoholic liquors. I believe there is a natural craving for some artificial stimulant with almost every human being, which is greatly increased by the cares and perplexities of life, and therefore is more apparent as age advances. This desire should be satisfied by the milder and least injurious drinks, as beer, light wines, etc.'"

Another states, "I think opium and its preparations are used to a considerable extent as stimulants, and am inclined to the opinion that such use is increasing, and that such increase is due, in some degree, to the excitements, suffering and mental disquietude resulting from the late war."

Clinton.—"Our apothecaries inform me," says our correspondent, that "the use of opium is steadily increasing among the people. I know of no particular cause for such increase, except the injudicious advice of some physicians."

Prescott.—"The preparations of opium are used by the people to some extent, otherwise than medicinally. I do not know whether the habitual use of opium has increased of late years or not; but my opinion, based upon conversation with those who sell it, is that it has not, in this vicinity, being confined mostly, if not wholly, to elderly people; and that young people are not forming the habit."

Boston.—Among the twenty or thirty druggists consulted, there seems to be a diversity of opinion on this subject. Many never sell opium without a physician's order, others have little or no call for it, while others have several habitual customers. The following statements are among the most important:—

"Believes the habit of opium eating diminishing, as he has fewer calls than formerly. He has only a single customer, at present, who sometimes buys half a drachm of opium daily."

"Has no regular customers, as he makes it a rule not to sell irregularly, and has advanced his price on such transient sales. Recognizes the fact that the habit is a general one in the community; but believes the abuse will be found more common in the country, where the drug can be obtained freely, and where stimulants are less available."

"Has two regular customers, who each average one ounce of opium every two weeks."

"Has one customer who buys half an ounce of opium at a time. The number of calls is less than formerly. Has observed that vet-

eran soldiers who contracted the habit in the army hospitals are still addicted to the use of opium."

"Sells a very small quantity of opium in the course of the year to the class of customers alluded to. States that the sales of the opium preparations to the country trade is out of all proportion to that of other drugs. Explains the fact by the universal appetite for stimulants or excitement. City people have amusements, social enjoyments and alcohol; country people have less of these. Thinks that returned soldiers are rather prone to the habit, having contracted it in the army. Would look for the opium abuse rather in the suburbs and in the country than in the city."

"Sells less than he did five years ago. Thinks chloral and bromide of potassium are taking the place of opiates."

"Has six habitual customers, some of them, merchants, who take the dose of opium or morphine before commencing daily business. The demand is steady without any apparent increase. Has noticed a marked tendency to kleptomania among customers of this class."

"There is less call than formerly, due possibly to recent change of location."

"Has noticed no increase in the call for the opium preparations. Thinks that physicians are not sufficiently careful in regulating and restricting the use of opium before it becomes a habit."

"In an experience of twenty-five years has observed no decided increase in the habit of opium eating. Recognizes the correlation in the abuse of opium and of alcohol. The opium habit frequently begins in the use of opium medicinally. Veteran soldiers, as a class, are addicted to it, and several cases have been observed among Italian hand-organists."

"Thinks the abuse is not uncommon in the community, but that it is less in Boston than elsewhere. Would look for it rather among professional men, than among the poorer classes."

"Has observed a slight increase in the call for opium, especially in the form of laudanum and paregoric. Cannot explain the cause of such increase."

"Of calls for opium and laudanum, thinks there are fewer than formerly. For paregoric, there is a greater demand for domestic use; and for morphia, there is an increased call, observed chiefly among the prostitutes of the West End, who take it for the sedative effect."

"From his own experience, believes that the habit of opium eating has increased within the last five years from 50 to 75 per cent. Never sells the drug without a physician's prescription, but

has on an average five or six daily applications for some one of its preparations. It is largely taken by prostitutes."

"Has six habitual customers, who take in various amounts the different preparations of opium."

"Has but one customer and that a noted Temperance lecturer."

"Has no regular customers, but has a good many purchasers from the country, thirty or forty at the least. Is decidedly of the opinion that the habit is increasing."

The preparations of opium reported as more commonly used are, besides the drug itself, laudanum, paregoric, sulphate of morphia and, occasionally, McMunn's Elixir. When a more prompt and stimulating effect is desired, as is often the case with those who have been addicted to alcohol, laudanum may be preferred. The sulphate of morphia seems to be growing in favor, its color and less bulk facilitating concealment, and being free from the more objectionable properties of opium. This salt is not only taken internally, but is sometimes used hypodermically. In one case reported in Boston, the whole body was covered with the scars left by the punctures of the injecting instrument. Paregoric is also largely used as a stimulant, although, as a sedative in nursery practice, it has been to a great extent superseded by the so-called "soothing sirups," in which opium is the active ingredient, as it is also in the various other abominable compounds which pass under the name of cough sirups, pectorals, cholera medicines, pain killers, etc.

Our Scituate correspondent reports that infants in that town are unmercifully drugged with soothing sirups.

In Winchester, also, these nostrums are mentioned as quite common, having quite displaced paregoric in the nursery. The basis of what is known as Winslow's Soothing Sirup is morphia. A recent analysis of a sample of this medicine gave one grain of the alkaloid to an ounce of the sirup; the dose for an infant, as directed, being four or five times that usually regarded as safe.* Godfrey's Cordial is also used for a similar purpose, containing more than a grain of opium to the ounce.

It is unnecessary here to enumerate the fearful consequences of the prolonged and excessive use of opium. If less marked in its immediate effects than alcohol, it is far more sure of its

* Opium and the Opium Appetite.

victim. Interfering, by its peculiar action upon the nervous system, with the processes of waste and repair, and with the important functions of digestion and secretion, its poisonous effects sooner or later begin to be apparent in the gradual emaciation, shrunken skin and sallow countenance. Enfeeblement of the mental powers, as well as of the moral sense, follows in its course, and the patient ultimately sinks into a condition of wretchedness and often of terrible and hopeless suffering, succeeded in the offspring, if such there should chance to be, by insanity or other form of nervous disease, and not unfrequently by an aggravated taste for every form of stimulant. Among the more common evidences of moral deterioration, are kleptomania, as noticed by at least one of our correspondents, and a marked propensity to untruthfulness.

It is said that longevity among opium eaters is by no means rare, and not a few elderly persons are reported by our correspondents, who are addicted to the habit; but it is more than probable that, in these cases, it was contracted at a period when length of life was already assured, and when stimulation, unless excessive, is less liable to be followed by the baneful effects of earlier indulgence. "The man who at twenty takes opium," says Poqueville,* "seldom lives beyond the age of thirty or thirty-six."

It may be added that the opium habit is rarely recovered from "Having used the drug for some time," runs a Chinese edict, "the men accustomed to it can by no means relinquish it; their faces become as sharp as a sparrow's, and their heads sink between their shoulders in the form of a dove; the poison flows into their inmost vitals, physic cannot cure their disease, and repentance comes too late for reform." It has been estimated that about one in six of those addicted to alcohol reforms, while among opium eaters success in such an attempt is extremely rare.

The consideration of a remedy for this habit, if such there be, hardly falls within our province. We may, perhaps, be pardoned the suggestion however, that, based as it is upon a craving that no laws can eradicate, the allowance of those milder stimulants, everywhere in use in Continental Europe, might aid, at least, in lessening the consumption of both alco-

* Travels through the Morea and Albania.

hol and opium. It is an instructive fact that, in the history of legislation, whether against opium, alcohol, tobacco or coffee, for all have, at different periods, been the subjects of legislative enactment, in no instance has the end sought been reached. Substitution, or successful evasion, has been the immediate consequence of all such efforts. In countries where the culture of the vine prevails, drunkenness and opium eating are comparatively almost unknown. It is certainly not unreasonable to suppose that the permitted use of the lighter wines, and, among malt wines, of lager beer, and the promotion of wine manufacture would tend to the prevention of the latter habit, and, in time, go far towards solving the vexed question which of late seems to have disturbed the public mind.



SEWING-MACHINES.

By Arthur H. Nichols, M. D.

THE EFFECTS ON HEALTH OF THE USE OF SEWING-MACHINES MOVED BY FOOT-POWER.

This inquiry relates specially to the influence of sewing-machines, driven by foot-power, upon the physical condition of women, and has been undertaken in pursuance of a general plan adopted by the Board of Health with the view of ascertaining, if possible, the influence exercised by certain professions, trades and occupations upon health and longevity, as well as to learn to what extent the so-called "industrial diseases" prevail in this State.

The history of the sewing-machine is interesting, as showing how by slow and gradual steps, and by the independent efforts of different individuals, this triumph of mechanism was finally perfected. For many years efforts had been made to construct an apparatus, which should produce an automatic imitation of sewing. The earlier machines contrived for this purpose were made to grasp a needle as in hand working, push it through the cloth, and pull it out on the other side, but these rude contrivances were not found practically useful. Several later attempts, both in England and France, were in a measure successful, and inventions were patented in both of these countries, which really involved many of the essential features of the modern sewing-machine. Thus a patent was granted in France in 1834 to M. Thimonier for a machine adapted to sewing purposes, which produced, by means of a crochet needle the so-called chain-stitch, while in England, a patent for a somewhat similar apparatus was obtained by Newton and Archibald in 1844. In the United States a patent was issued in 1835 to Walter Hunt for a machine for producing the shuttle or lock stitch, while J. J. Greenough obtained in 1842 a patent for a machine using the double-pointed needle, and intended for heavy leather work.

But to Elias Howe, Jr., of Cambridge, is now universally awarded the merit of having invented and introduced to the public the first practical machine suitable for general purposes of sewing, which produced a stitch by means of two threads, a vertical needle with the eye in the point, and a small shuttle for interlocking the stitch. His patent bears date of September 10, 1846, but his invention was made and described several years previously. Mr. Howe's original machine contained many imperfections, the chief of which was in the feeding mechanism and the shuttle, but these were speedily modified and improved, particularly by the invention of Mr. Wilson, known as the rotating hook, designed as a substitute for the shuttle, and combined with a new method of propelling the stuff. Other improvements are adapted for making a variety of stitches or performing some special work, such as making button-holes, but whatever merits they may individually possess, they must all be regarded as modifications of the original machine of Mr. Howe, all being more or less dependent upon the apparatus originally patented by him.

The machine of Mr. Howe having been displayed at various exhibitions, and extensively advertised at a low price, was speedily introduced into general use, effecting a complete revolution in several branches of manufacturing industry, and particularly in the manufacture of shirts, clothing, boots, hats and caps.

With this important accession to the productive force of female labor, the products of their industry have been very greatly augmented. It is estimated that one machine does the work of at least six pairs of hands, and the consequence is that those articles which it assists to make, are now furnished in much greater profusion than before. The abundant supply has effected a very material reduction in the price of these commodities, while their cheapness places them within the means of a larger number. The increased consumption stimulates in turn a demand for an increased supply, and the impulse thus given to manufacture creates a demand for more operatives, the result of which is that the number of persons employed in this industry constantly increases.

Fears were expressed when this machine was first introduced, that it would injure needle-women by reducing their wages and

throwing large numbers out of employment, so that in many parts of England its introduction was violently opposed by the trades unions. It is stated, for instance, that at Stafford, where women are extensively employed, the agent of the Howe machine having attempted to introduce it to their notice in the market-place, was assailed by a mob and compelled to leave the town, while as recently as in 1864, complaint is made in the "London Times" that the use of the machine was not permitted to tailors and shoemakers connected with trades unions in that city.

In this respect the sewing-machine has had to contend with the usual objections which have ever been raised against labor-saving inventions; viz., that they create a diminution in the demand for human labor, and thus deprive multitudes of people of employment.

The obvious reply to this allegation is, that, as a matter of fact, experience has demonstrated that the demand for human industry is *not* diminished, but very greatly increased by the introduction of machinery. "The evils necessarily incident to its introduction are slight, partial, and transient. They reach only to the surface of society, affect but small portions of the community, and speedily pass away. The benefits arising from the same source are substantial, universal, permanent. They are seen everywhere, felt everywhere, and must abide forever." In other respects has this invention proved a benefit to the community, for it has brought into existence numerous large factories, devoted to the manufacture of these machines, also of needles and a particular kind of thread, and as the American machines have thus far maintained their superior reputation for mechanical accuracy, general appearance and cheapness, the demand for them in Europe has steadily increased notwithstanding the hostility which was at first evinced. The result of this is, that a new and important addition has been made to our list of foreign exports.

The following table, prepared with great care by Messrs. Wheeler & Wilson, will perhaps express more intelligibly the actual difference in the amount of time required to stitch certain garments by machine and by hand:—

	By Machine.		By Hand.	
	Hours.	Minutes.	Hours.	Minutes.
Gentlemen's shirts,	1	16	14	26
Coats,	2	38	16	35
Silk waistcoats,	1	14	7	19
Linen waistcoats,	–	48	5	14
Cloth trousers,	–	51	5	10
Summer trousers,	–	38	2	50
Silk dress,	1	13	8	27
Merino dress,	1	4	8	27
Calico dress,	–	57	6	37
Chemise,	1	1	10	31
Petticoat,	–	35	7	28
Drawers,	–	28	4	6
Night dress,	1	7	10	2
Silk apron,	–	15	4	16
Plain apron,	–	9	1	26

The sewing-machine had not long been introduced before it began to be alleged that certain ill effects were caused by its use. These complaints, originating among a few workwomen, obtained credence with prominent physicians, and very general apprehensions were expressed as to the deteriorating effects of this labor. Until a few years, however, all researches upon this question have been confined to the experience of a very limited number of women, for the most part those presenting themselves for treatment at the hospitals, or else from a cursory visit to some large workshop, so that the facts elicited would seem insufficient to justify any absolute conclusions.

Dr. A. K. Gardner * as early as in 1860 gave it as his opinion, founded upon many years study of machines of all patterns, that this invention is the greatest boon of the nineteenth century, especially to the female, and that without an appreciable drawback. He avers that no injurious effects whatever are caused by it, beyond the exhaustion which is necessarily felt from this, as from every other overwork. "Finding," he says, "no proof that physical disease originates from, or is even aggravated by, the use of the sewing-machine, I am forced to believe that in the moderate use of the muscles of the lower extremities, the analogy holds good in this as in every other form of labor, that

* The Hygiene of the Sewing Machine. American Medical Times, 1860.

use strengthens the organs; that while the use of half the body is not so conducive to health, or to an equal development of the entire body, as if the whole frame were exercised, that it is certainly better than no exercise at all, which falls to the lot of the confined hand-sewers."

Dr. Vernois on the other hand, published an article in the 'Annales d'Hygiéne Publiques'* in 1862, maintaining that in the case of both male and female operatives, the movements of the lower limbs produced an irritation of the sheaths and tendons of the extensor and flexor muscles, inducing attacks of cramp, followed at times by partial paralysis, and causing, also, in the case of females just beginning the use of the machine, the development of a peculiar nervous excitement.

Dr. William Ord, in his report on the sanitary circumstances of dressmakers and other needle-women in London (Sixth Report of the Medical Office of the Privy Council, 1863, p. 381), describes the condition of several large workshops where machine work was done, and comes to the conclusion that wherever the work is constant and regular, the influence of the sewing-machine is for the most part beneficial to the workers, inasmuch as they can earn at least half as much again as needle-workers, whether payment is made according to time or by the piece. He is, moreover, of the opinion that the circumstances of the muscles of the limbs and trunk being kept in moderate exercise, associated with the power of procuring good food, tends to improve the health of the machinist. On the other hand, he admits that the cramped position which the operator is forced to assume causes at times pain in the chest and indigestion, while in some other instances headache and giddiness are produced by the constant rattle of the machines. Moreover, a certain class of delicate women, unused to hard living or muscular toil, are greatly exhausted by this particular work, just as a clerk would be by digging. Some such women were seen by Dr. Ord, who according to the evidence of observers, had grown old with great rapidity, at the rate of five or six years in three.

In 1866, M. Guibout, physician to the "Hôpital Saint Louis," in Paris, read a paper before the "Société Médicale des Hôpitaux," in which he gives his experience touching the inconveniences of the sewing-machine, based upon the testimony of a

* Ann. d'Hyg. Pub., 1862, 2e serie, t. XVII., p. 137.

few operators who had presented themselves for treatment. In this paper he cites several instances of women who had suffered severely from the long continued alternate movement of the lower limbs, and the swaying of the body. The chief ailments complained of were loss of flesh and strength, leucorrhœa and the local nervous irritation alluded to by Dr. Vernois. One of these women, who had been obliged to give up her place on account of these symptoms asserted, "that out of five hundred employed in the factory with her, at least two hundred suffered as she did, so that the operatives were constantly changing, none of them being able to remain long. Those who entered strong and well were soon obliged to leave, weak and emaciated." The opinions of M Guibout, based upon the doubtful testimony of a limited number of women found wide acceptance in this country as well as in Europe, and not unnaturally excited very general apprehensions that serious physical injuries must result from this kind of labor.

Shortly after this, Dr. Fournier encountered in the hospital a girl 18 years old, affected with a paralysis of sensation of the entire plantar surface of the foot, extending to the deep parts, caused by the prolonged contact with the metallic pedal; and the extensive publication of this case added to the alarm.

The results of a series of observations made by Dr. Espagne,* Professor at the Montpellier University, upon a portion of the inmates of a public institution in that city, numbering in all 146, were published in 1869. Although the substitution of an artificial motive-power is strongly advocated by this writer, the opinion is expressed that the use of the machine with foot-power does not exercise any general deleterious influence upon the health of those operating it, apart from general fatigue and muscular pain.

It is to Dr. E. Decaisne,† however, that we are indebted for the only extensive inquiries thus far made upon this subject, begun originally among the families of his acquaintance, and followed up among professional operatives, occupying in all the space of about two years.

* Adolphe Espagne. Sur l'industrie des machines à coudre à la Maison Centrale de Montpellier; Montpellier Médical, mai, 1869.

† La machine à coudre, et la santé des ouvrières; Par Dr. E. Decaisne. Ann. d'Hyg. Pub., 1870, 2e serie, t. XXXIV., p. 105.

These investigations, extending to so large a number of women, and prosecuted in so thorough and methodical a manner, were stimulated, it would appear, by the observations of M. Guibout, and as the conclusions arrived at must carry with them very great weight, it would seem worth while to transfer to these pages a portion of the article.

The total number of women examined was 661, varying in age from 16 to 25, all accustomed to about the same kind of food, and subject to similar hygienic conditions, except that while 380 were employed in shops, 281 worked at home. Of these 380 working in shops, 127 had worked at least three years, 348 at least two years, and 186 at least one year. All were very carefully questioned as to the effects of their work upon the muscular system, the digestive organs, the respiratory and circulatory apparatus, the nervous system and the sexual organs, and with the following results:—

The muscular system.—Here the effects varied with the age of the operative, and the length of time spent daily in work. Thus, in the case of 312 women between the ages of 16 and 25, 104 of these working from eleven to thirteen hours daily, and 21 working from seven to eight hours daily, complained of fatigue, and ill-defined muscular pains, accompanied at times by cramps in the limbs and pain in the region of the kidneys; all of which generally disappeared after a short rest in bed. In 104 out of these 312 the chief trouble was referred to the lower extremities. The fatigue and pain was particularly marked in those who were just beginning the use of the machine, and was much less frequently complained of after a few months experience. In no instance was paralysis of the plantar surface of the foot met with, attributable to the prolonged pressure of the foot upon the pedal.

Of the 226 women between the ages of 25 and 35, of whom 104 worked from eleven to twelve hours daily, and 102 from eight to nine hours, 82 complained particularly of cramps in the legs, 61 of general muscular pains, and 29 of pain in the kidneys. Of 95 women between the ages of 35 and 52, of whom 53 worked from ten to eleven hours, and 42 from eight to ten hours, 18 were found to suffer from cramps in the legs,

14 from general muscular pains, and 61 from pains in the kidneys.

In all these classes it was found that the amount of the fatigue and pain was greatly diminished with increased experience in running the machine. Among 28 women, between the ages of 18 and 40, working from three to four hours daily, but not professional operatives, no ill effects were ascribed to the use of the machine.

Effects upon the Digestive Organs.—Of the 661 women examined by Dr. Decaisne, more than three-quarters complained of disordered stomachs, indigestion etc. The majority, however, admitted having suffered similarly before commencing this work, though they generally maintained that these troubles had since been more persistent. Inasmuch, however, as dyspepsia is found to prevail to an equal extent among operatives of every class, employed for a longer or shorter time daily, it would not appear that any marked effect was produced upon the digestive organs by this particular work.

Respiratory Apparatus.—Dyspnœa, or difficult breathing, is a common complaint among these operatives, but no more so, as was found upon inquiry, than among needle-women in general. About 40 women asserted that the menstrual discharge had been more abundant since beginning this work, while some alleged, that in this respect they had been more regular than ever before. The records of "Hôpital Lariboisière" furnish no evidence that miscarriages are especially common among this class. As to the production of leucorrhœa, 500 women were examined, of whom 306 suffered from this ailment, which in most cases, however, it was admitted, had existed before they began to work.

The general conclusions arrived at by Dr. Decaisne from observations made on these 661 women are as follows:—

1. The effects of this work upon the muscular system differ in no respect from those of any other kind of excessive labor involving the use of certain portions of the body to the exclusion of others. The affections most commonly complained of

are muscular pains, pain in the region of the kidneys, and cramps in the lower extremities; none of which, however, are developed among those working three or four hours daily. These pains, cramps, etc., are most commonly found among beginners, and usually diminish after one has become accustomed to the motion of the machine.

2. Although it is evident that excessive labor must prove a powerful cause of disorders of the stomach in women, we are not justified in accusing this machine with producing those affections of the digestive organs which are met with in so large a proportion of women engaged in any kind of work.

3. Certain affections of the respiratory organs, and especially dyspnœa, are met with in about the same frequency in machine-operators and hand-sewers.

4. The rattle and jar of the machine produces some discomfort at the beginning, but to this noise one soon becomes accustomed, and no ill effects upon the nervous system can be ascribed to this cause, as has been alleged.

5. The peculiar nervous effect caused by the alternate movement of the feet upon the treadles, upon which so much stress is laid by M. Guibout, is, as a matter of fact, of extremely rare occurrence; and even where it occurs, it is seldom the fault of the machine, but is connected with the anterior habits or moral perversion of the operative.

6. Women engaged in working at the machine are not, as has been pretended, more subject than other working women to menorrhagia, leucorrhœa, miscarriage and peritonitis, and the cases of this kind that are quoted, indicate merely the results of work beyond the strength of the individual woman.

7. The use of the sewing-machine, when employed within moderate limits, without overworking, as is too often done, is attended with no greater inconvenience to health than working with the needle, as was shown by the examination of 28 women between the ages of 18 and 40, employed from three to four hours daily.

The Sewing-Machine Industry in Massachusetts.

There are probably few localities in which sewing machines are more extensively manufactured or employed than in Massachusetts; and it would seem therefore that the views of those

whose experience here has enabled them to form decided opinions, would possess a particular interest, when compared with the results of similar observations abroad. For this reason, inquiries on this subject were addressed in the last annual circular of the Board to its correspondents, while at the same time personal visits were made to many of the principal workshops, and all possible information obtained from those having charge of the operatives, as well as from the workwomen themselves.

The most obvious and natural method of inquiry would consist in examining carefully a large number of women accustomed to this labor, as was done by Dr. Decaisne, which would enable us to compare the prevalence of particular disorders, and thus work our way to a detection of the remote and proximate causes of these disorders. Experience has shown, however, that outside a hospital or dispensary, very great difficulties lie in the way of collecting distinct and trustworthy information from any very large number of women, owing to the impossibility of conversing with them while at work, or of visiting them in their homes; the delicate nature of some of their ailments; a failure on the part of many to appreciate the utility of the inquiries; the fact that the evidence is given under the eye and influence of the employer,—these and other causes conspire to render the testimony derived from the operatives, so far as the statistics of disease is concerned, very imperfect and inexact.

The evidence of proprietors and foremen, on the other hand, has been obtained from capable and trustworthy persons, most of whom have no interest in disguising the truth, and this latter testimony is the more valuable from the fact that it is so uniform in its character. It is, moreover, strongly corroborative of the views of the great majority of medical men, both here and abroad.

The question asked in a printed circular issued by the Board, was:—"*Have you observed any injury to health from the use of sewing-machines moved by foot power? If so, please to send us all the information you may have on the subject*"

Replies have been received from one hundred and thirty-eight (138) correspondents, representing one hundred and

twenty (120) towns in this State and several large cities in other States.

Of this entire number, eighty (80) report one or more instances observed by them, in which ill effects were produced by the use of the sewing-machine.

Fifty-eight (58) return negative or doubtful answers; but it is to be remarked, that the experience of nearly all this number is limited to towns where machines are employed exclusively in private families.

The following are extracts from the replies of the various correspondents.

Replies from Physicians in Massachusetts.

"Although I am aware that much diversity of opinion exists among the members of our profession regarding the effects produced by the use of sewing machines, I have for a long time been convinced that they not unfrequently, when used for a long time, cause serious physical derangements; and such an opinion I have expressed at our Society for Medical Improvement.

"Quite a number of cases in which pain and lameness in the back and thighs, dyspepsia, leucorrhœa, vaginitis, menorrhagia existed, I have attributed to their employment. In some cases relief has been surprisingly rapid after their use has been discontinued, and as rapidly retarded by their reëmployment.

"Unquestionably, the woman running her sewing machine at her own dwelling, would be much less likely to suffer than she who is exposed to the *close air* and *stated hours*, and many other inconveniences which are not unfrequent in the various workshops."

"Sitting in an inclined position, while the clothes are laced tightly, causes dyspepsia and constipation. This, together with the continued moving of the limbs, causes uterine diseases."

"Not hurtful unless when work is excessive."

"Almost without exception, *some* injury to health has followed the constant use of a machine for any considerable extent of time. The complaints are chiefly weakness and pain in the knees, hips and small of the back; affections of the urinary apparatus (producing sometimes scantiness, sometimes increase), and in many cases uterine derangement; leucorrhœa and ovarian neuralgia; ulceration of the os uteri seems also to be induced by the constant running of the machine in tailors' and dressmakers' shops."

"Machines are common in families, but I have heard no complaint of injury."

"I have met with the greatest number of diseases from this cause in my dispensary practice, especially among tailoresses, and to a less extent among the girls who sew for dressmakers.

"The most common disease I have seen is a chronic form of ovaritis, which it is impossible to cure while the girl is working, and which is sure to return even after a long apparent cure, if the use of the machine is resumed.

"If the ovaritis has lasted a long time, I generally find some lateral version of the uterus with congestion and other sequences of this affection. Occasionally I meet with cases of corporeal metritis, and still more rarely with displacements and excoriations of the uterus, that seem to be caused by the use of the machine; but I am inclined to believe that in the most of these cases, the trouble has previously existed in a mild form, and has only been aggravated by the use of the machine.

"In looking over my hospital records, I am able to find but one typical case of disease caused by the use of the sewing-machine. Our actual statistics in this respect are meagre from the fact that the girls, though incapacitated for working, are seldom so acutely ill from this cause as to lead them to enter a hospital.

"It is my belief that all women, in whom any tendency to uterine or ovarian disease exists, and who use the machine steadily, are sure to be made ill; and that at least one-half the girls who are apparently well when they begin to support themselves by machine sewing, become its victims in the course of a year or two.

"Among the patients of a higher class, who only use a machine occasionally, I am almost always obliged to forbid its use, so long as the slightest uterine or ovarian disease remains, as its use for only an hour a day is sure to be followed by an increase of all the bad symptoms.

"The use of the machine during menstruation is especially injurious. I have even known a case where a severe attack of ovaritis and retroflexion of the uterus followed its use during a single menstrual period."

"We have in this town a large number of sewing machines, but as there is no one that obtains a living in this way, I have observed no injury therefrom."

"I think I have observed a greater tendency to dysmenorrhœa

and other uterine troubles among those who use the sewing-machine for a living than among others."

"I have several times observed marked injury resulting from the use of sewing-machines. The effects have been dysmenorrhœa, leucorrhœa and back-ache."

"I attribute the poor health of one young lady to the use of a sewing-machine. She has great loss of physical power, pain in lumbar region and knees. A moderate walk is sufficient to bring on pain."

"A greater tendency to dysmenorrhœa and other uterine troubles observed among those who use sewing machines for a living."

"One correspondent has obtained the opinions of twelve of the practising physicians of his city. Two of these have observed well marked uterine disease, miscarriage and threatened miscarriage, malposition of the fœtus, flexion and prolapsus uteri, as effects of too constant use of the sewing machine. Others have seen less direct results, such as debility."

"I have often prohibited the use of sewing-machines, when the individual has consulted me on account of weakness or disorder of the loins or pelvic viscera."

"I have never observed any injury to health from the use of sewing-machines that could be demonstrated; that is to say, those that use them steadily are subjected to such depressing hygienic influences, crowded in rooms with bad air, long hours of labor, deficient sun-light, &c., &c., that any injury to health might with as much propriety be attributed to these causes as to the sewing-machines."

"Cases of unmistakable injury very frequent a few years ago, causing marked irregularities of the menstrual function and their usual sequelæ. The almost universal introduction of steam-power has greatly diminished this class of cases."

"Sewing-machines in general domestic use, but without ill effects so far as observed."

"I have observed great injury from sewing-machines. I have seen cases of leucorrhœa, and even prolapsus uteri, which seemed to have their origin in this employment."

"I have thought that females using sewing-machines were particularly subject to uterine diseases and spinal troubles."

"Many sewing-machines are used here. As it is a rather prevalent opinion that they injure those who use them in their daily work, I have made inquiry of three or four young women who thought they were injured, as to the manner in which they were affected. Pain in the back, exhaustion and faintness were the conditions complained of. No uterine disease or disturbance was named. All the persons alluded to were feeble women whose strength would be easily exhausted by any continuous labor. The daily use of machines moved by foot-power is exhausting work."

"There is one family of four girls in this town, not one of whom can run a machine an hour without bringing on excessive leucorrhœa."

"I have known uterine diseases caused and aggravated by protracted use of sewing-machines."

"Sewing-machines are used in shoe manufactories; driven by foot-power, they are a pest, causing pain and weakness in the hips and back, with leucorrhœa, inflammation of the uterus, debility and general derangement of the health. The operators are learning this by experience."

"I have seen two cases so marked that it became necessary to desist entirely from the use of the sewing-machines. It caused uterine irritation, leucorrhœa, &c., and in one case a nervous irritation corresponding to that described by M. Guibout."

"One case of functional uterine disease, and one of general debility observed; both subsiding on discontinuing the work."

"I can recall the case of a young woman who stitched boots ten hours daily, was obliged to desist in consequence of cough, pain in the back and loins, and scanty menstruation, apparently developed by her work."

"I have noticed an increase of preëxisting uterine disease."

"The health of many females is undermined from this cause, principally by too much confinement and lack of fresh air."

"Excessive backache caused by sewing-machines."

"Should think uterine diseases were much increased."

"I have attributed much debility to the use of these machines. I have a patient with bands of adhesion running from the uterine neck to the posterior wall of the vagina, which I believe to have been produced in this manner. The patient ran a machine three years, and was quite well previously. She has been married several years and has no children."

"I have entertained the opinion that impairment of digestion and of the general strength has taken place from this cause."

"I have met with a case of uterine trouble with profuse leucorrhœa, much aggravated by the use of the sewing-machine."

"For a few years past, I have had my attention called to the effect of these machines, and I think they cause much disturbance of the pelvic viscera, particularly engorgement and congestion of the uterus."

"Hundreds of cases under *general* supervision. Cannot now recall particular cases, at it was several years ago. Lameness of back and limbs quite common now. Nervous disease or depression aggravated in a few cases by overwork on machine. Some cases of uterine disease aggravated by excessive sedentary occupation. No specific effects of machine noticed. Miscarriage never observed. Consumption, general and nervous debility aggravated by machine work. Less lameness of back and limbs since introduction of steam-power. If women work fewer hours they suffer less illness at home than in the work-room."

"Some complain of inability to run the machines, saying that it causes pain in the back, loins and legs; and some have told me that it always causes leucorrhœa."

"I have had well attested cases of spinal irritation, metritis and cystitis, caused by running sewing-machines."

"I have had but few opportunities of observing the effects of the use of sewing-machines upon the health. So far as I am capable of judging, I should say that the women operating them suffered no special ill consequences, but experienced merely the usual results of sedentary labor."

"Although my attention has not been called particularly to the class of cases mentioned, I have seen instances of leucorrhœa, that were aggravated by working the sewing-machine. * * * The introduction of steam-power has lessened the amount of illness in sewing workrooms. * * * There is less illness among those who work the machines at home."

"I have forbidden their use in a few cases, thinking they were the cause of uterine difficulties."

"In one shop where foot-power is used, uterine disease seems to have been developed in several instances."

"The tendency seems to be to produce a weakness of the back or want of muscular power in a marked degree, impeding locomotion."

"In several cases, weakness and pain, more or less constant, in back and thighs, have occurred following the use of sewing-machines."

"I have observed cases in which severe nervous symptoms were consequent on too continuous use of the machine; repetition always followed by recurrence of symptoms."

"No ill effects observed other than those traceable to sedentary employment."

"Constant and long continued use of sewing-machines moved by foot-power tends to induce functional diseases of the uterus." An instance reported in which "three girls working in the same shop ten hours daily for two or three years now suffer from dysmenorrhœa, from which they were formerly free."

"Disease of the pelvic organs, lameness of the back, extreme nervous debility and miscarriage have fallen under my observation, as the results of the persistent use of the machines."

"No ill effects observed; machines are used only for domestic work."

"I think I have seen uterine diseases aggravated by the protracted use of sewing-machines."

"Uterine difficulties and nervous derangements are often observed in those who use the machines daily."

"I believe the daily use of the sewing-machine pernicious to health, but it depends somewhat on the kind of work; it is most injurious where much dust is inhaled."

"The only persons known to be injured are those who have jobwork at their own homes, and who work a great number of hours with the machines. With such there is a general failing of health, which rest has soon restored."

"I have seen two cases of what I called chronic muscular lameness of the abdominal muscles from long continued and closely applied use of sewing-machine moved by foot-power."

"In one or two cases, the effect has been to develop pulmonary disease in those having a previous tendency to the same."

A correspondent has collected information from several practitioners residing in one town, as follows:—

"I have had several married and unmarried women consult me, who complain of severe and persistent neuralgic pains about the pelvis, with general poor health, anæmia, palpitation and pain in left side, who were using the sewing-machine quite extensively. These symptoms were obstinate under treatment, and it was only after they had given up the use of the machine that they were relieved."

"I have seen leucorrhœa, menorrhagia and abortion caused by use of sewing-machines moved by foot-power. I think I have seen ovaritis from the same cause. I am confident that ill health in some form inevitably follows the protracted and constant use of the treadle."

"Young ladies tell me that the close application and the excitement of running a sewing-machine make a great strain upon the nervous system. I have recently had one case of sciatica in a large

strong, handsome and happy woman who was serving as an accountant, and also working a sewing-machine a great deal. The disease subsided under rest, blisters and aconite; it returned when she resumed the sewing-machine, and was again relieved after the rest, etc., as before."

"I think it very wearing and laborious work, and the general health often breaks down. I have seen no satisfactory evidence that it induces any special local disease."

"I believe that I have repeatedly seen uterine diseases aggravated by constant use of the treadles of sewing and other machines."

"From general observation, believe the use of sewing-machines with foot-power positively injurious."

"In my opinion, the use of sewing-machines operated by foot-power is frequently detrimental to health, and I have in several instances noticed marked improvement from their disuse."

"As generally used, they appear to be a benefit rather than an injury."

Replies from Physicians in other parts of the United States.

"I have for several years recognized the fact that the use of the sewing-machine produced the various uterine affections. It also aggravates existing uterine disease. In my opinion there is less illness since the introduction of steam-power. I think, moreover, that there is less illness among those who work at home, than in those engaged in workshops."

"I have known some diseases produced by running sewing-machines by foot-power. Uterine diseases—leucorrhœa, displacements and inflammations—appeared to be aggravated. Lameness of limbs and back often observed."

"I have investigated quite a number of cases, where diseases were produced by running sewing-machines by foot-power. Among these diseases I have noticed several cases of lameness of limbs and back, menorrhagia, dysmenorrhœa, amenorrhœa, leucorrhœa, displacements, and, in professional operators, a tendency to rheumatic affections of the lower extremities, and soreness of the muscles; also, quite a number of cases of nervous disease, as well as those in which uterine inflammations had been aggravated. I have frequently observed that where ladies are subject to uterine diseases, these troubles are invariably aggravated after much use of the domestic sewing-machine, as in the spring and autumn. There

is less intercostal neuralgia and lateral curvature of the spine among the women in the work-rooms since the introduction of steam-power, as both arms are now equally exercised. There is less illness among those who operate sewing machines at their own homes than among those who work in shops, as the former do not work so constantly, nor under so great a pressure."

"I cannot say that I have seen, in sound women, any particularly bad influence. The class who use these machines are usually subjected to confinement, excessive labor, bad air and diet, etc., and most of them would be ailing under similar circumstances without the machine, at any other vocation.

"It is very common for me to see women of the better class who are already complaining of uterine maladies, reproducing or aggravating their symptoms by this kind of exercise; but any other kind of fatigue would also be prejudicial.

"There can, however, I think, be no question that from the constrained position, etc., etc., the labor of a sewing-machine is bad, particularly in case of uterine maladies."

"Many cases investigated. I have been chiefly engaged in teaching medicine in different medical colleges in the United States during the last twenty years. I have often seen cases in consultation, where there was reason to believe that 'lameness of limbs and back, dyspepsia, lung disease, nervous disease or depression, menorrhagia, dysmenorrhœa, amenorrhœa, leucorrhœa, displacements, inflammations and miscarriage,' have been caused by the use of the sewing-machine by foot-power. I have no doubt whatever that this employment among females is more powerful and efficient in the production of disease of various kinds in that sex than almost all other causes combined. Many of the diseases are also aggravated. Much less illness among women in work-rooms since the introduction of steam-power; and much less illness among those using the machines at home."

In prosecuting these researches into the sanitary condition of machine operatives, visits have been made to many workshops in Boston, Salem and Lynn, embracing all the different branches of this industry, and especial attention has been given to the health of the women, as ascertained from their own evidence and that of the proprietors or foremen, as well as from their physical appearance; their hours of labor, their earning and the means adopted for ventilation. To all these places I

have obtained ready access, and have invariably been treated with civility. The following description of some of the establishments will indicate how wide a range of difference there exists in all these different circumstances :—

1. A work-room connected with a large wholesale and retail dry goods and furnishing establishment, in which about thirty women are employed between the ages of eighteen and thirty; of this number ten do machine-work. The apartments are warmed by steam and the air is fresh and pure. A dressing-room communicates with the work-room, in which are conveniences for washing &c., The average earnings are stated by the proprietor to be $7 to $8 a week, where payment is made by the day; $8 to $12 a week by the piece, work in the latter case being inconstant. Hours of work from 8 30 A.M. till 5 P.M., with one hour out for dinner. The women are without exception neat and well dressed, and appear to be in fair health, though not robust. The following are extracts from their written evidence as to the effects of their employment :—

A.—"Has worked three years at the machine; average, eight and one-half hours daily. Has experienced no ill effect, except fatigue when she works unusually hard."

B.—"At sewing machine ten years; eight and one-half hours daily. Has suffered constantly from pain in the back, so that on two occasions she has been obliged to give up work entirely. Complains also of nervous prostration and general debility, but she finds that all these troubles disappear after a few days rest, so that by taking a vacation of a few weeks each year, she is able to continue at her work. Always enjoyed good health before commencing to work."

C.—"Six years at sewing-machine; nine hours daily, always well before working. Now suffers from dyspepsia and general debility. Is greatly relieved by rest in bed."

D.—"Has worked three years (though not constantly) eight hours and a half daily. Suffers from pains in the back and shoulders when she works steadily. These pains disappear when she suspends work."

E.—"Six years at the machine; average eight and one-half hours daily. Was perfectly well before beginning to work. Has since been troubled with pain in the shoulders and back, and indigestion. Obtains great relief whenever she can get a few days' rest."

F.—"Has worked three years, from nine to twelve hours daily. Complains of pain in small of back and physical prostration."

G.—"At the machine six years, eight and one-half hours daily. Perfectly healthly before commencing to work. Is now troubled with cramps in the limbs, and indigestion. From the latter she gets but partial relief, even when favored with a short vacation."

H.—"Has worked during the busy season only, one year and a half, eight hours and a half daily. The only ill effects experienced have been pains in the limbs, which leave her as soon as she stops stitching."

I.—"Has done machine work between eight and nine years, working from eight to nine hours daily. Never knew a sick day before beginning to operate, but considers that her health has been seriously impaired by this labor. Complains principally of indigestion. Is unable to continue at work throughout the year without taking a vacation."

J.—"One year and seven months at machine work; nine hours daily. Previously well and robust; and now suffers from pain in the limbs and dyspepsia. Rest affords some relief."

2. An establishment for the manufacture of clothing, shirts &c. The average number of operatives employed is seventy-five, and every possible attention is paid to their comfort. In going to and from the work-room, which is in an upper story, they are expected to make use of the elevator. When ill they are visited by the superintendent. Hours of work from 8 A.M. to 6 P.M., with one hour out at noon. Income $8 to $9 a week, working by the day; working by the piece, many are able to earn $1.50 a day. The average price paid for board is $6 a week. The superintendent states that he has had on the average fifty machine operators under his supervision for a number of years, and has also had the opportunity of watching during the same period an equal number of hand-sewers. His opinion is that the effect of machine labor is injurious where foot-power is used, and that only very strong women are able to work constantly for any length of time without experiencing some ill effects, which are generally aggravated at the menstrual period, and women who have persisted in their attempts to work at this time have not unfrequently fainted at the machine. He has observed in some instances that stout, robust women coming in from the country to obtain employment have declined

in health very rapidly soon after beginning this work. The complaints most frequently heard are of pain and cramps in the lower extremities, pains in the back, and diseases peculiar to women. The hand sewers, he thinks, are exempt as a class from special diseases, and suffer less from fatigue. Complaints among them are rare, and long continued employment produces no such effects as those above described. The machine operatives on the other hand are constantly changing, some being able to hold out two or three years, but very few longer than this. Steam-power has recently been applied to the machines in this establishment, and with its introduction, a marked change has been noticed in the condition of the workwomen, so that the former complaints are rarely alluded to. Operatives are naturally unwilling to work in those establishments where foot-power is still required, provided they can obtain employment where steam is the motive-power. With the aid of steam, 850 stitches can be made in a minute by the Wheeler and Wilson machine, 500 being the maximum obtained by foot-power. With the Wilcox and Gibbs' machine the difference is still greater.

3. A manufactory of cloth gaiters in Lynn. Work-room in the upper story; present about forty women, the majority of whom appear sufficiently healthy, but some look thin and pallid. Hours of work from 7½ till 11¾ A.M. and from 1 till 6 P.M. or till sunset in winter. Earnings from $5 to $12 a week; now and then a woman can earn $16. Board costs $4.50 or $5.

The earnings for work done in the shop last year amounted to $12,888.16, besides $1.500 paid for extra work done at home.

As the season advances, business improves and more hands are required. The machines used are the "Howe," "Grover and Baker," "Empire" and "Singer." The foreman states that for the past five years he has had constant charge of from fifty to sixty women; running formerly by means of foot-power, but during the past year by steam, so that he has had an opportunity of comparing the different effects of this work upon the same individual. This particular branch of work is less fatiguing than many others, inasmuch as the stitching is not so continuous, a larger proportion of the time being spent in preparing and arranging the materials. Formerly there were frequent

complaints of pain in the back and limbs, and not unfrequently the operatives gave out completely. He has noticed there was invariably a falling off in the comparative amount of work done the latter part of the day, owing to their exhaustion. Now no such severe effects are observed, as when the treadle was used, though some still complain of pain in the back.

4. Mr. J. T. is the proprietor of an establishment for the manufacture of boots and gaiters; during the past eleven years has had the personal oversight of from fifty to seventy-five women; formerly running by foot-power, now by steam. He considers the work severe, but still is of the belief that the women enjoyed quite as good health, and lost as little time, as the average of mill operatives or hand sewers. The fatigue experienced was most marked during the first few months, but after they learned how to get the 'balance of the treadle,' and to maintain their bodies in the proper position, the work came easier. When the women have become absolutely ill, he has found this very often to be the result of imprudence on their part, rather than overwork in the shop. They are quite reckless about exposing themselves, and notwithstanding all cautions will persistently go from the hot shop into the open air insufficiently clad, and in wet weather will go to and from their meals in thin shoes. This carelessness seems to him a more probable cause of the lung troubles which prevail among this class. The introduction of steam has tended to lighten very considerably their labor, and has moreover proved in a pecuniary point of view a profitable one to him. It being in the dull season at the time of the visit, work was not going on.

5. A boot manufactory, employing from 40 to 50 women between the ages of 14 and 35. Earnings $8 to $30 a week; the average earn $15. The foreman states that he himself worked continuously at the sewing-machine for twelve years, from ten to twelve hours daily, experiencing no ill effects whatever, nor did he find it very fatiguing. Formerly the operatives at times gave out from excessive fatigue, especially during the menstrual period, and were obliged to suspend work for a few days, but he has never noticed any permanent ill effects. The machines in this shop are now all run by steam, though till

quite recently foot-power was used. Twice each year, in spring and autumn, the shoe trade is dull, so that the operatives are allowed a vacation of three or four weeks, which gives them an opportunity of returning to their homes and recruiting. Many would give out from sheer exhaustion were it not for the chances of prolonged rest in the country thus afforded them.

6. A manufactory of machine-sewed slippers, employing on the average fifteen first-class operatives. The workshop consists of one end of a large loft which has been partitioned off. Warmed by a coal stove. Air tolerably fresh. Ventilation by means of windows, doors and scuttles. The "Singer" machines are used for the most part, and from the nature of the stuff stitched, an unusual amount of force is necessary to drive the treadle. The physical appearance of the women was good. Some were particularly stout and ruddy, and when questioned, affirmed very positively that they experienced no ill effects from their work. All work done by the piece. Duration of labor from 7½ to 8 hours daily. Earnings from $10 to $20 a week each. The majority earn $15 The average amount paid for board $5.50 a week. According to the testimony of the foreman, the operatives are constantly changing, the greater part leaving after three or four months work, and very few remaining as long as a year. For this reason, he is unable to form an opinion as to the general effects of labor on individuals. His general impression is that where the feet are the propelling power, the work is extremely arduous, and if pursued uninterruptedly beyond a certain length of time is absolutely injurious, causing physical weakness rather than any particular ailment. Has never known a woman to break down in the shop, but thinks they may be injured without being aware of it, and he is able to recall several instances in which uterine diseases were developed after they had quit work and become married. He is convinced that it is unprofitable to attempt to carry on this business by foot-power, and it has therefore been decided to transfer, at once, this factory to another building, where steam can be had.

The following testimony was cheerfully given (in writing) by such of the operatives as chanced to be present at the time of the visit:—

A.—"Has worked at the sewing-machine ten hours daily for ten years experiencing no ill effects whatever. Age twenty-seven years."

B.—"Age twenty-two. Has been employed at this work eight hours daily during five years, and is perfectly well."

C.—"Age thirty-five years. Length of time at this employment twelve years, nine hours daily. Complains of pain in limbs and back, and uterine troubles, which did not previously exist."

D.—"Age twenty-four years. Has worked at the sewing-machine eight years, eight hours daily, and in consequence thereof has become greatly reduced in strength."

E.—"Age forty-two years. At this employment six years, daily average six hours. Suffers from pain in limbs and uterine disease, which did not previously exist."

F.—"Age twenty-one years. Has worked at the sewing-machine seven hours daily for two years without feeling any evil effects."

G.—"Age twenty-four years. At this employment seven hours daily for three years, and enjoys good health."

7. A shoe manufactory employing about fifty operatives in the busy season. At present no work is being done. Steam was introduced into this workshop six years ago. The proprietor states that for a number of years he had about thirty women at work with the old treadle. He entertains the opinion that running the machine by foot-power must involve a very severe strain upon the muscular and nervous system, but no more so than the work of mill operatives which requires so much walking. Does not believe that this industry is productive of any specific disease. Since steam-power has been used, there has been much less complaint of fatigue on the part of the women, and consequently they are not inclined to accept work at those shops in which they are obliged to move the treadle. The result of this state of things is that those shops in which foot-power is still retained, have to put up with an inferior class of operatives. The following incident will serve to show the opinion of the women, as to the amount of relief afforded by steam power: A short time ago, it became necessary to make some repairs upon the boiler, which would occupy, it was thought, several weeks, and being at the time pressed with orders, he determined to continue work in the meanwhile by the aid of foot-power. Treadles were therefore adapted to

thirty-two machines, and that number of women were set to work. At the end of the first day, seven of this number gave notice that they preferred to suspend work until the repairs were finished. At the expiration of the second day, six more decided to quit work, and before the week was over, the shop was quite deserted. These persons were perfectly accustomed to both kinds of motive-power, and chose to lose from two to three weeks' work, rather than go back to the old treadle, and submit to the additional fatigue of providing their own motive-power. He is of the opinion that this labor, although arduous, may be endured nine hours daily without detriment by able-bodied, healthy women, provided they will take sufficient rest at home, and not subject themselves to the additional fatigue incident upon frequenting parties and balls,—a practice which is very common among this class.

8. A workshop for the manufacture of gaiters, situated in the upper story of a large building. Present about twenty women, some few of whom were comparatively clean, but the majority dirty and untidy. Air confined and filled with tobacco smoke. The room is without means of ventilation, except by lowering the windows, and this is objected to on account of the draught. An air-tight stove furnishes the heat. Machines all run by foot-power. The proprietor has never noticed any bad effects originating in this employment, and some of the hands present were said to have worked pretty steadily for eight or ten years.

9. An establishment similar to the preceding; area of workshop in cubical feet, 22,950; persons present, 31. As work increases, the number of hands is increased to 50. Area allotted to each individual 453 to 740 feet. Income from $5 to $20 a week, all being paid by the piece. The average earnings last season were $11 a week each. The age of the operatives varies from 15 to 40. Nearly all are single. Room heated and machines driven by steam. Duration of work, 10 hours. The air is close and unwholesome, no means being adopted to maintain ventilation. At times the sashes are lowered by some, I was told, but are soon raised again by others, who maintain that the danger and inconvenience arising from exposure to a cold draught is greater than that incurred by breathing impure air.

The foreman has heard of no especial complaint from these women, and has had no experience with foot-power.

10. A manufactory of gaiters; at present idle, business being slack. Machines all of the "Singer" pattern. The proprietor has been six years in the business employing thirty women. For three years he used treadles, but for the last three years, steam has been the motive-power. The latter is in every respect preferable. Formerly the hands were constantly giving out from physical exhaustion and various ailments. Since steam was introduced, however, they express themselves quite able to work eight hours daily, so that very little time is lost. There are three women connected with this shop, who were absolutely "worn out" by the use of the old treadle, and compelled to give up work. Now they have returned, and have no difficulty in doing full work. In his opinion, women who take work home are injured by their irregular manner of working. Thus, for the sake of spending their afternoons in promenading the street, or visiting, they will drive work very early in the morning and late at night.

11. A workshop similar to the preceding, where foot-power is still used. About thirty women employed stitching cloth and kid gaiters. Average earnings, eight dollars a week, though some can earn three dollars a day. The proprietor is not aware that any especial ill effects are caused by this labor, but admits that he is obliged to put up with a very inferior class of operatives, the better workwomen being attracted to shops where steam is used. The fact of his not employing steam places him in a very dependent position, for the women understand that if they leave, it is with the greatest difficulty their places can be refilled. For this reason he proposes to dispense with the use of treadles as soon as practicable.

12. A work-room connected with a wholesale and retail dry goods and furnishing store giving occupation to fifteen or twenty women, for the most part running light "Wheeler and Wilson" machines by foot-power. A large number of shirt bosoms are made here, of which one woman can stitch from ten to sixteen dozen a day, according to her skill, strength and capability.

For this work the price paid is now but twelve cents per dozen, whereas formerly fifty cents per dozen was paid for the same work. This branch is particularly laborious, much more so than stitching upon woollens, cottons, dress goods, or even leather, since the work being prepared beforehand by others, the motion of the limbs is continuous, giving but little chance for rest. The result is that there are frequent complaints of pain in back and limbs, while uterine affections are common. The hands are constantly changing, about one-quarter of all those employed breaking down in the course of one or two years. Work here is uncertain, and the average earnings do not exceed $6 a week. The forewoman herself was obliged to give up the use of the machine on account of neuralgia of the feet produced by contact with the iron of the treadle.

13. A wholesale and retail clothing store. About fifty persons present in workshop, some being engaged in preparing the stuff, others in pressing the finished goods, but about thirty at machine work, using the old treadle. Duration of labor, eight and one-half hours. Earnings from $8 to $12. According to the foreman, no precaution is omitted here, the observance of which can add to the comfort or convenience of the workpeople. Large ovens have been recently introduced, so that their dinners may be brought in tin pails and served warm with a cup of tea at noon, in case their boarding places are distant, or the weather is stormy. The amount of work exacted, however, makes the labor exceedingly onerous, the result of which is that the women, without evincing any especial disease, undergo a slow physical deterioration, so that they are in a measure unfitted for severe work of any nature. Instances are familiar to him in which they have suffered from leucorrhœa, and other diseases peculiar to women, coming on after they had left the shop and become married, rendering them quite incapable for the performance of household duties.

The following are extracts from the testimony of the workwomen, given in writing at request of the foreman :—

A.—"Has worked at the sewing machine one year and nine months. Daily average nine and one-half hours. Has suffered

from various ill-defined complaints which did not exist before entering upon this occupation; has never suspended work long enough to obtain relief."

B.—"At the sewing-machine about three years. Daily average nine and one-half hours. Suffers from pain in back and limbs, and dyspepsia. These troubles did not exist previously, and are relieved when work is suspended."

C.—"Has worked at the sewing-machine about eleven years averaging nine hours daily. Has never experienced any ill effects, but considers her case exceptional."

D.—"Four and one-half years at the sewing-machine, with daily average of nine and one-half hours. Is troubled with pain in back and limbs, so that she is frequently obliged to quit work, thereby obtaining relief. Was free from these complaints before commencing this work."

E.—"Has been employed at the sewing-machine four years and three months. Daily average, nine and one-half hours. Has never been troubled with any disease, before or since."

F.—"At the sewing-machine one year. Daily average nine and one-half hours. Feels pain in shoulder which did not previously exist and has steadily increased. It is relieved when work is suspended."

G.—"Length of time at this employment two and one-half years, with daily average of nine and one-half hours. Has often experienced ill effects from complaints which did not previously exist, but is very well at present, although her circumstances are such as to allow of no rest. Has been advised by physicians to give up this employment."

H.—"Has worked at the sewing-machine five years. Daily average nine and one-half hours. Was in perfect health before entering upon this work, but thinks she shall be obliged to give it up, as she experiences pain in her back and limbs, and her health is fast failing. Suspension from work affords partial relief."

I.—"One year at sewing-machine, with daily average of nine hours. Has suffered to such an extent as to make her consider the work injurious."

J.—"Time of employment at sewing-machine five years, nine and one-half hours daily. Experiences pain in back and side, which continues after she has stopped working."

K.—"Has worked at sewing-machine seven months, averaging nine and one-half hours daily. Complains of pain in her side and swelling of the feet since commencing this work; has never tried the effects of resting for a time."

L.—"Three years at sewing machine, averaging nine and one-half hours daily. Is troubled with cramp in the feet and pain in the side and back. Had none of these complaints before entering upon this occupation; has never had a vacation."

M.—"Has worked seven years at the sewing machine, averaging nine and one-half hours daily. Has very often experienced various ill-effects, which are much relieved when work is suspended for a time. Health previously very good."

N.—"Has used the sewing machine nine and one-half hours daily for five weeks. Suffers from pain in back and side."

O.—"At this employment four years, nine and one-half hours daily, but has never been troubled with any disease."

P.—"Has worked at the sewing machine nine and one-half hours daily for one year. Complains of pain in back and limbs which did not exist before that time. Has never tried the effect of rest."

Q.—"Has been employed at the sewing machine five and one-half years, averaging nine and one-half hours daily. Was previously troubled with dyspepsia, but considers that it has since been aggravated; experiences also pain in back and limbs. Has never been able to suspend work."

R.—"At this employment nine and one-half hours daily for three years. During this time has experienced pain in side and limbs, but has never stopped work."

14. From the forewoman of a large workshop:—

"In charge of work-rooms five years. Three women at a time at work with foot-power machines. Lameness of back or limbs in all who run machines by foot-power; two cases of dyspepsia aggravated; one case of nervous depression seen; two instances of swelled limbs and one of "female weakness" aggravated; the latter whilst on vacation not troubled at all, on return to work same as before."

15. From a manufacturer of machine-sewed slippers:—

"Has had in his employ from fifteen to twenty female operatives for a number of years. His experience convinces him that where the machines are moved by foot-power, the labor is very exhausting, so that the women are not unfrequently forced to abandon work. Since the application of steam, however, as the propelling power, the health of the operatives has improved in a marked degree

while the cost of manufacturing has been materially diminished. More work is now turned out in the same number of hours, and with very much less fatigue to the women, so that the same individuals who formerly lost considerable time, owing to the fatigue and pains induced by moving the treadle, now make no complaint, and are able to work uninterruptedly."

16. From the superintendent of a large shoe-shop, employing forty-five machines run by means of steam-power :—

"My opinion is that any woman who runs a sewing-machine by *foot* power, *constantly*, either at home or in a manufactory, will sooner or later suffer from it. I do not believe, however, that it is at all injurious to any woman to do such sewing as generally belongs to one family, on a foot-power machine."

In conversing with proprietors and foremen it is not unfrequently alleged that in certain branches of this industry the operatives are being "worn out," or "used up." With the idea of ascertaining just what is meant by this popular expression, I have taken the trouble to search out and examine several operatives who were reported to have suffered in this manner, and will record the chief details of one case, which may be considered as typical of all.

Miss A., aged twenty, an intelligent, well-educated young woman, belonging to a very respectable family, living in easy circumstances, began to work at a machine at the age of seventeen in a large establishment in this city, being employed upon leather. This work she undertook in opposition to the wish of her relatives, and with the object of earning sufficient money to enable her to continue the study of music. She worked eight hours a day, exerting herself to the utmost, and her earnings were from $2.50 to $3.50 a day, being the most that was paid to any of the hands. Being known to her employer, she was particularly favored in not being obliged to perform much of the heavy labor required of the other hands, such as carrying heavy bundles up and down long flights of stairs. She had previously enjoyed the best of health. From the very first, the effect of this work was exceedingly exhausting, causing pain in the back and particularly between the shoulders. The impure air of the

unventilated work-room caused her no little discomfort. Her appetite, which had heretofore been excellent, soon began to fail, and at the same time her strength began to diminish. These symptoms grew steadily worse, so that at the end of a year she was forced to suspend work for a time. After a rest of two months she became sufficiently improved in health to resume her place in the shop, but the ill-effects before experienced speedily returned, and as she persisted in her labor, were greatly aggravated, till at last it was no uncommon thing for her to faint on reaching home after the day's work. At the expiration of two and one-half years from the time of her entering the shop, her condition was such that she gave out completely, and for the last six months has been confined for the most part to the house, though of late she has rallied somewhat. Her own opinion, strengthened by that of the physician is, that she is suffering from no organic disease, but from nervous prostration engendered by prolonged overwork, and she is therefore encouraged to hope that she will in time regain her former vigorous health.

The explanation of these cases, then, would appear to be this: that a gradual loss of vital power may be entailed by the fatigue occasioned by the long continued use of the same muscles. As regards this muscular fatigue, the beginner naturally suffers more seriously, because she has not learned to direct the movements of the foot upon the treadle, nor properly balance the body. In the course of a few months, however, as the motions of the limbs are better understood, a more skilful expenditure of strength is made, and as the muscles now become firmer and stronger, the amount of fatigue experienced is diminished, provided the daily amount of work is not increased. The individual above referred to was no novice, having been long familiar with this labor, but stimulated by a laudable motive, forced herself continually to perform what was beyond the power of physical endurance.

In considering the condition of these operatives, it may be well to premise, that, while they represent different ages and nationalities, by far the greater number were born in this country, and are usually single women between the ages of 18 and 30. The average earnings of those who have learned

to work are quite sufficient to enable them to secure good homes, sufficient clothing, and a liberal amount of wholesome food, consisting of three substantial meals daily. The general habits of these persons are almost invariably good, but instead of adopting a style of dress in accordance with their circumstances, there prevails a foolish ambition to clothe themselves as expensively as the wealthier classes, so that a large proportion of their earnings is expended for fineries. Some, moreover, are in the habit, during the winter season, of frequenting balls where late hours are kept, and it is not to be wondered at, if this exercise in addition to their day's work should prove a strain beyond the power of the system to endure. Others have sewing-machines at their homes, and after working nine or ten hours in the shop, endeavor to add to their earnings by evening work, and it would indeed be a matter of surprise, if, under this double pressure, they did not soon succumb from overwork. One woman, for instance, is reported to have worked fifteen hours daily for quite a number of months, until of a sudden she broke down completely, and has since suffered from affections which render her a complete invalid.

It should be observed that there exists a very great difference in the arrangements of the different establishments. Some shops consist of low-studded apartments on the upper floor of lofty buildings, each occupied by twenty to thirty persons, and heated by an air-tight stove to a temperature of 75° to 80°. In these rooms, although the air is often foul, no attempts at ventilation are made except by opening the windows, and no provisions whatever are made for water-closets. In such places it was found that the standard of personal neatness and cleanliness was invariably a low one, and, although the operatives were at the time apparently free from disease, their general appearance indicated the detrimental nature of their surroundings.

It has been demonstrated in England, by Mr. Simon, that the foul and unwholesome air which is apt to prevail where many persons are engaged in any in-door industry, tends to develop a certain class of fatal lung diseases, so that occupations which in themselves may not endanger health, become seriously injurious, and he therefore lays it down as a rule, established by mortuary statistics, and to which there is probably no exception,

"that in every district which has a large in-door industry, the increased mortality of the work-people is such as to color the death return of the whole district with a marked excess of lung disease," and "that in proportion as the people of a district are attracted to any collective in-door occupation, in such proportion, other things being equal, the district death-rate by lung diseases will be increased."

It is more agreeable to call attention to other workshops, where all practicable arrangements are made for diminishing the dangers necessarily incident to an in-door occupation, and conspicuous among these are the establishments of C. F. Hovey & Co., Jordan & Marsh, and Macullar, Williams & Parker, all in Boston, where there are spacious rooms, properly heated and well ventilated, with dressing-rooms attached, and in short providing all the necessary elements of health and reasonable comfort. As would be naturally inferred, such advantages do not fail to attract a superior class of operatives.

It should be borne in mind that this industry comprehends several quite distinct branches, and that the ill-effects produced are very decidedly modified by the nature of the material which is being stitched; and this fact, which seems to have escaped the notice of all who have hitherto written upon this subject, will serve to explain the seemingly contradictory testimony of different individuals. Thus, stitching shirt-fronts is generally admitted to be the most fatiguing of all, inasmuch as the stuff is closely woven, and moreover is rendered stiff by the sizing. In the division of labor, this work is previously made ready for the machine, and nothing being left for the operative but this monotonous stitching, no opportunity is afforded for rest or change of position. Then, again, the earnings for this particular work are very small, so that ordinary wages can be made only by the most rapid and prolonged labor.

Woollens are stitched with much greater ease, nor is it so important that the stitches should be exact and even; hence women engaged upon men's and boys' clothing complain less of fatigue than those employed upon shirt-fronts. The least onerous work of all done with the sewing-machine, and that which commands the highest wages, is the stitching of cloth and kid gaiters, which branch is extensively carried on in Salem, Lynn, Manchester and Beverly. In this work the seams are short,

and considerable time is required in preparing and arranging the materials, so that the movement of the lower limbs, instead of being continuous, as in the case of those employed upon shirt-fronts, is constantly interrupted. Thus the machine being in motion less than two-thirds of the time, frequent intervals are afforded for rest and a change of posture. Another very important privilege, which this class share, is a vacation of several weeks in the spring and autumn, which most avail themselves of to visit friends in the country. Thus many causes combine to render their labor much less onerous than that of those establishments where work is uninterrupted throughout the year, and hence they are able to keep on year after year, without suffering from those ailments to which others succumb, whose strength and power of endurance are more severely taxed.

It must, however, be apparent, that this unnatural movement of the feet upon the old treadle for eight or nine hours daily, tends to produce in a large proportion of women fatigue, pain, and cramps in the limbs, back and loins, the degree of which will depend upon the physical capacity of the individual, and the material which is being made up. If this labor is persisted in, the result is that a physical deterioration may be induced, the constitution becoming insidiously weakened, in which condition, certain specific diseases, particularly those peculiar to women, may be developed and aggravated by the abnormal amount of blood forced into the pelvic organs, or, if no special disease is developed, their reduced condition is made manifest by the decided manner in which trivial illnesses affect them. These results, it is true, are identical with those induced quite as often by other kinds of excessive labor, such, for instance, as that of mill operatives, and cannot therefore with propriety be classed with the so-called "industrial diseases," such as lead, phosphorus, or mercurial poisoning, or the lung disease of miners, inasmuch as they are to be attributed, not so much to the effect of a legitimate use of the machine, but rather to its abuse from overwork.

Indigestion and want of appetite is a very common ailment among these women, as it is among all those whose habits tend to a sedentary, in-door life, and this must be assigned not to one but to many causes, prominent among which are the foul air of the work-rooms, and the hurried manner of taking meals.

The important question remains to be considered, what means can be suggested to ameliorate the condition of these operatives, and to prevent the occurrence of those ill effects which have been shown to be not inseparable from the nature of the occupation. These may be summed up as follows:—

First. It has been laid down by Mr. Simon as a sanitary right of workpeople, "that whatever work their employer assembles them to do, shall, so far as depends upon him, be, at his cost, divested of all needlessly unwholesome circumstances." The superior physical condition of agricultural laborers, as compared with town artisans, indicates pretty clearly that the open air is a more natural element to man than a confined, impure atmosphere, and work-rooms should therefore be so constructed as to furnish the largest possible quantity of fresh air, provision, of course, being made for protection against draughts. It is therefore not unreasonable to demand, on the part of employers,—

1. That improvements should be made in the internal arrangements of the workshops, and that some method of ventilation should be adopted, apart from the doors and windows, by means of which a supply of pure air may be admitted to the rooms, but in such a manner as not to blow directly upon the operatives.

2. In order to render tolerable the fatigue of this monotonous work, it is important that the hours of labor should be limited, and that the practice of taking home extra work to be done at irregular hours should not be encouraged. While it cannot be alleged that the regular hours of work of any of the large establishments are at present excessive, especially when compared with the amount of labor required in similar workshops in England, allowance must be made for the difference in the comparative physical strength of American and English workwomen, the latter being more robust, and capable of greater endurance, than the former.

3. More time should be allotted for taking meals. The short time allowed by these women for taking breakfast and dinner is a frequent cause of one of their most common complaints; viz., indigestion. Provision should also be made for regular exercise in the open air, than which, nothing is more

essential to the health of persons engaged in sedentary, in-door occupations.

Second. It is now pretty generally conceded, by those who are most familiar with the subject, that the substitution of some new attachment to take the place of the original crank-treadle would render this labor much less onerous. Steam-power is unquestionably the most efficient and economical propelling agent, where a large number of machines are used together, and it is a matter for congratulation that the deteriorating influences incident to this industry have been already so greatly diminished by the almost universal adoption of this agent by the larger establishments.

There are at present on exhibition, at the store of Mr. B. L. Griswold, in Salem, two sewing-machines which are run by means of electro-magnetic motor power, an invention of Mr. J. P. Tirrell of Boston, for which a patent was obtained in August, 1871. The invention of Mr. Tirrell consists in a series of electro-magnets arranged radially in a frame, in combination with a series of radiating arms, placed on one or both sides of this frame, and connected with a shaft, which acts as a circuit breaker, or device for successively making and breaking the electric circuit through the several electro-magnets as the shaft revolves. By means of this ingenious and novel contrivance, a simple and efficient electro-magnetic machine has been constructed of sufficient power to drive a sewing-machine. The speed of this engine may be regulated by moving the frame which supports the electro-magnets in such a manner that the arms are attracted to these magnets with more or less force, accordingly as it is desired to increase or diminish the speed of the engine. The Smee battery has thus far been employed in connection with the magnets, but experiments are now being made with the hope of replacing it with one more compact, less expensive and requiring less attention. This engine has been subjected to severe tests, and has been found equal to the hardest work. I was informed, for instance, that, with the aid of this apparatus, a " Wheeler and Wilson " machine would stitch three thicknesses of cotton at the rate of seven hundred stitches a minute. It has not as yet been manufactured for sale, nor is it expected that it can be offered at a price within the means

of the poorer class of professional operatives who take work to their homes, and who stand in the greatest need of some such contrivance. To meet the wants of the latter, several new treadles have been recently brought forward and are now competing for public favor, several of which I have carefully examined, and of these there are two which seem to possess decided merits, and are therefore deserving of especial mention.

The Parsons treadle.—Mr. C. C. Parsons of New York has succeeded in perfecting a very simple and ingenious treadle, which was patented August 17, 1869, the object of which is to do away entirely with the heel-and-toe movement, and substitute for it a swinging backward-and-forward movement of the feet and legs, not unlike that of a pendulum, the point of suspension and centre of oscillation being coincident with that of the knee-joint of the operator. The cradle in which the feet rest can be raised or lowered to adapt it to the operator, and, being moved by the muscles of the legs alone, the thighs as well as the trunk remain absolutely at rest, so that the movement is an easy and natural one, and requires a much smaller expenditure of force than the old treadle. This treadle is beginning to be known in New York, where it is now recommended by physicians, and it is to be regretted that Mr. Parsons has not yet attempted to call public attention elsewhere to its advantages. I have seen four women who have been in the habit of using it irregularly three or four hours daily, and they all affirm that no pain, either in the limbs or back, is produced by its use. One lady states that she has been in the habit of doing the work of a large family for eleven years, using the old treadle nine years, that of Mr. Parsons two years. With the former, an hour's work was sufficient to cause great fatigue and pain in the back; whereas with the latter she is able to stitch steadily for three hours, experiencing no pain whatever, and only about as much fatigue as would be felt after a long walk. The testimony of professional operatives would be more conclusive, but, so far as I can learn, the invention has not yet been tested in any of the workshops in this vicinity. It is added to old machines at an expense of $5. (See engraving, p. 220.)

The Hall treadle.—The invention of Mr. W. Smith Hall is covered by several patents, the first of which bears the date of June, 1867. It obtained a favorable notice at the fair of the Massachusetts Charitable Mechanics' Association in 1869, and has since come into extensive use in this vicinity. With this treadle the power is applied solely by the downward movement of the foot, which pivots at the heel instead of the instep, while the rate of speed is regulated by the strength of these movements of the feet and not by their number. This renders unnecessary that rapid motion of the limbs, on the part of the operator, which causes the entire body to sway and vibrate. Among the advantages claimed in behalf of this invention, the following appear to be the most prominent:—

1. The great variety of motion allowed to the feet. The machine can be driven by one foot or both, or either alternately, the two foot-pieces being independent of each other. A slow, alternate motion is generally preferred, which permits one foot to rest while the other is being brought down.

2. There are no dead levels. By the aid of the "pawl-and-gib" movement, the crank is entirely dispensed with, and the machine can therefore always be started without the necessity of applying the hand to the balance-wheel.

3. The ease with which it is worked. There being no power wasted, much less force is required to move this treadle. To express the actual difference in figures, it has been estimated that while the force required to accomplish 150 stitches by the old treadle is equivalent to that necessary to raise a weight of seven pounds 165 inches, the same work may be done by means of this treadle by the force necessary to raise two and one half pounds 60 inches. (See engraving, p. 220.)

I have taken considerable pains to seek out those operatives who have had the most experience with this treadle, and their concurrent testimony will be found to be very strong in its favor.

1. An intelligent dress and cloak-maker, short in stature, physically weak, being afflicted with a congenital curvature of the spine, has had above six years' experience with different

machines, working on the average from eight to ten hours daily. The old treadle caused her great fatigue, and constant, severe pain in the small of the back. Has now used the "Hall" treadle for a little over two years, and during this time has experienced no pain whatever from her work. She is, indeed, less fatigued by working eight hours at the machine than she would be after sewing the same length of time by hand. She considers it almost impossible that any ill effects can result from the use of this treadle, its motion is so easy.

2. A well-formed woman of medium height, aged 28, has had eight years' constant experience with sewing machines, and has used the "Hall" treadle the past two years. She has been employed in several large establishments, working always nine or ten hours daily. She states that excessive fatigue and pain in the back were caused by the old machine, so that she was obliged to stop always at the end of every hour and take a few moments' rest. With the "Hall" treadle so little force is required to drive the needle, and so great a variety of movement is allowed the feet, that she is scarcely conscious of putting forth any exertion whatever; so that she now completes her day' work without feeling any pain, and with comparatively little fatigue, accomplishing within the same time one-half again as much work as formerly.



THE PARSONS TREADLE.



THE HALL TREADLE.

General Conclusions.

So far as the above returns go, due allowance being made for the exaggeration on both sides, experience in this State seem to justify the conclusions:—

First.—That the sewing-machine may be used by a healthy woman of average strength for three or four hours daily (a length of time sufficient for the work of an ordinary family) without causing excessive fatigue, nor any appreciable ill effect.

Second.—That the illnesses which most frequently prevail among professional operatives making use of the treadle are:—

a. Indigestion, attributable to the unhealthy conditions in which they pursue their occupation, particularly the impure atmosphere of the work-rooms, the sedentary employment, and want of open-air exercise.

b. Muscular pains, affecting the lower limbs and trunk, produced by the long-continued, frequent use of the same muscles.

c. Diseases peculiar to women, aggravated by, rather than caused by, the plethoric condition of the pelvic organs, induced by this exercise.

d. General debility. By this is meant a state of physical deterioration and nervous prostration brought on by overwork.

Third.—That other ill effects, such as neuralgia of the feet from contact with the iron treadle, affections of the spine, as well as the nervous effects described by M. Guibout, are worthy of mention only from their extremely rare occurrence.

Fourth.—The unhealthy tendencies of this occupation may be greatly diminished by the substitution, if practicable, of some other motive-power than that of the feet, or the adoption of one of the improved treadles above described. It is, moreover, of very great importance that, in those establishments where large numbers are congregated, attention should be directed to the proper ventilation of the work-rooms.

SLAUGHTERING, BONE-BOILING AND FAT-MELTING.

By THE SECRETARY.

The arguments to show its necessity were drawn from various sources, but chiefly a careful examination of the whole system (or rather want of system) as it existed in the neighborhood of Boston. The Brighton slaughter-barns were shown to be without drainage and surrounded by filth of the most revolting kind, coming from the half-putrid blood and offal. On this disgusting food hogs were fed, destined to make pork for our markets. This, in fact, was the only mode of disposing of the refuse portion of the slaughtered beeves and sheep. The dangers to the consumer were pointed out in the liability to have meats from diseased animals dressed for the markets.

Fat-melting and bone-boiling, as carried on in the vicinity of Boston, were described, and the odors proceeding from these places, as well as from the open vats used for boiling dead horses and other animals, were shown to be sickening and vile, such indeed as no one should be compelled to breathe,—an encroachment, for private convenience, upon the greater rights of the general public who can demand protection from such nuisances.

The remedies for this state of things were definitely stated. They were to be found in the concentration of the business of slaughtering in large establishments, where every part of the animals could be utilized on the spot in the most cleanly and economical manner, without the stench of putrefaction, or the waste incident to transportation and to the use of clumsy processes.

It was also shown that the boiling of animal matters could be conducted in such a way that all offensive vapors should be consumed by fire.

The value of the blood now wasted, and worse than wasted, in filthy pig-pens, was represented to be very great.

It was shown to be capable of conversion into a fertilizing powder, worth more than Peruvian guano, or to be used for the extraction of its albumen, now largely required in the arts.

The report closed as follows:—

"To complete the reform in the modes of slaughtering in the vicinity of Boston in such a way that nobody shall suffer and everybody shall gain, there are needed one or more *abattoirs*, containing all the improvements which European experience can furnish or modern science suggest. They need not be expensive buildings, although they should occupy a large space. They

SLAUGHTERING, BONE-BOILING AND FAT-MELTING.

[A history of the efforts of the State Board of Health to bring about a reform in these processes.]

One of the tasks undertaken by the State Board of Health on its first organization, in September, 1869, was an investigation of the processes in use among us for preparing meat for the markets, and for the disposal of the fats and of animal refuse; that thus the way might be opened for such reform in these trades as would benefit the community in both its sanitary and economical interests. This purpose has been constantly kept in view.

The health of the people demands an abundant supply of wholesome meat, and it also requires that air, which is as truly food for the lungs as is meat for the stomach, shall not be polluted by the odors of animal decomposition whether occurring by natural or artificial methods.

The so-called "offensive trades," we believed, could be rendered inoffensive, and our aim was first, to show how this reform could be made, and then to promote it in every possible way. The success of these efforts is now clearly foreshadowed.

We propose to trace, as briefly as possible, the various steps by which, since our Board was established, the whole subject of slaughtering, fat-melting and bone-boiling, has reached the stage in which it is now presented to the legislature.

The first report of the State Board of Health (January, 1870) contained a report on "Slaughtering for Boston Market" in which reform was urged on the grounds of public health and of economy.

The arguments to show its necessity were drawn from various sources, but chiefly a careful examination of the whole system (or rather want of system) as it existed in the neighborhood of Boston. The Brighton slaughter-barns were shown to be without drainage and surrounded by filth of the most revolting kind, coming from the half-putrid blood and offal. On this disgusting food hogs were fed, destined to make pork for our markets. This, in fact, was the only mode of disposing of the refuse portion of the slaughtered beeves and sheep. The dangers to the consumer were pointed out in the liability to have meats from diseased animals dressed for the markets.

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The value of the blood now wasted, and worse than wasted, in filthy pig-pens, was represented to be very great.

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The report closed as follows:—

"To complete the reform in the modes of slaughtering in the vicinity of Boston in such a way that nobody shall suffer and everybody shall gain, there are needed one or more *abattoirs*, containing all the improvements which European experience can furnish or modern science suggest. They need not be expensive buildings, although they should occupy a large space. They

should have comfortable stables for protecting and fe
animals. As regards the slaughter-house itself, the
things seem to be,—

"1. A pavement of stone or of some material impe
blood.

"2. An abundant supply of water.

"3. Complete drainage.

"4. Vats for the 'rendering' of fat and offal on the sp
putrefaction can attack them.

"5. The means of converting blood into blood-albume

"The *sanitary* advantages of such a system would be,-

"1. The removal of the present offensive odors.

"2. The removal of slaughter-house pork from the marl

"3. The ready inspection of meat, thus insuring the re
that which is unfit for food.

"The *economical* advantages would be,—

"1. Diminished liability of having meat spoiled by ex
the emanations from the putrid pig-pens.

"2. The value of the blood, which would be saved and

"3. The savings which must always accompany order, sy
division of labor, the avoidance of transportation, and t
any business on a large scale.

"4. The greatly increased value of land in the vicini
present slaughter-houses."

In looking at the above conclusions in the light of tw
additional experience, we believe they are correct.
might now be added to the economical advantages a n
tinct recognition of the value of offal, as well as of bl
conversion into a fertilizer.

The evils with reference to these trades were thus p
in January, 1870, and have been a subject of public di
ever since. The Brighton butchers evidently regar
ideas as unpractical, and our remedies as vain. The
other citizens of that town, however, who earnestly de
be rid of the nuisances by which they were surroun
through their efforts a bill was passed by the legislature,
the following is a copy:—

AN ACT to incorporate the Butchers' Slaughtering and Melting Association in Brighton, and for other purposes.

Be it enacted, &c., as follows:

SECT. 1. Horace W. Baxter, Horace W. Jordan and B. Francis Ricker, their associates and successors, are hereby made a corporation by the name of the Butchers' Slaughtering and Melting Association, to be located in the town of Brighton, for the purpose of carrying on the business of buying and slaughtering cattle, sheep and other animals, and of melting and "rendering" establishments, subject however to the provisions hereinafter contained, and to all general laws now, or that may hereafter be in force applicable to such corporations.

SECT. 2. Said corporation may take and hold, by purchase or otherwise, such parcel of land, not exceeding one hundred acres in extent, and situated in Brighton, within two miles of the Cattle Fair Hotel, as the state board of health shall by vote determine to be suitable for the carrying on of said business; and said corporation shall within sixty days from the time it shall take any land otherwise than by purchase, file in the office of the registry of deeds for the county wherein said lands lie, a description thereof, as certain as is required in a common conveyance of lands, together with a statement of the purpose for which the lands are taken, which description and statement shall be signed by the president of the corporation.

SECT. 3. The corporation shall be liable to pay all damages that shall be sustained by any persons in their property by the taking of any land for the purposes of this act. Any person, who shall sustain damages as aforesaid, and who shall not agree upon the damages to be paid therefor, may apply by petition for the assessment of his damages, at any time within one year from the taking of said land, to the superior court, in the county in which said land is situate. Such petition may be filed in the clerk's office of said court, in vacation or in term time, and the clerk shall thereupon issue a summons to said corporation, returnable, if issued in vacation, to the then next term of the said court, held fourteen days at least after the issuing of said summons, and if in term time, returnable on such day as the court shall order, to appear and answer to the said petition; the said summons shall be served fourteen days at least before the return day thereof, by leaving a copy thereof with the clerk of said corporation, and upon the return of said summons duly served, the said petition shall stand as a cause in said court, and all questions of fact relating to the damages sustained by the petitioner shall be heard and determined, and the amount of such damages shall be assessed by a jury of said court, unless the parties

shall in writing waive their right to a jury trial and agree that the question of said damages shall be determined by the court; and the verdict of said jury, being accepted and recorded by said court, or the award of the court, if jury trial shall be waived, shall be final and conclusive, and judgment shall be rendered, and execution issued thereon, and costs shall be recovered by the petitioner if the amount of said judgment shall exceed the amount offered him for his damage by said corporation before the filing of said petition; otherwise said corporation shall recover its costs.

Sect. 4. Said corporation shall proceed to build upon said land suitable buildings for the slaughtering of cattle, sheep and other animals, and for melting and rendering purposes, and all necessary stables and outbuildings. But no building shall be erected until the plans thereof, with all details of construction, shall have been submitted to and approved by said state board of health, or some person designated by said board to examine said plans. All the business of said corporation shall be carried on in accordance with such regulations as said board shall from time to time establish and furnish in writing to the clerk of said corporation, and for each violation of any one of said regulations, said corporation shall be liable to a fine of not less than twenty nor more than five hundred dollars, to be recovered by indictment against said corporation. Subject to the foregoing provisions said corporation may manufacture and sell any of the usual products of said slaughtering and melting business, or may lease or permit other persons to use their buildings or parts thereof on such terms as may be agreed upon. And each member of said corporation shall have the right to slaughter on the said premises, subject to such regulations and such tariff of prices as said corporation may, by vote at any regular meeting, establish, and to the regulations of the said board of health as aforesaid. And any person engaged in slaughtering or other business on the premises of said corporation, who shall violate any of the said regulations of said board, shall be liable to the penalty herein before affixed to violations thereof by said corporation.

Sect. 5. The capital stock of said corporation shall consist of two hundred thousand dollars, to be divided into shares of one hundred dollars each, and said corporation shall not take any land as herein before provided or commence business until the sum of one hundred thousand dollars at least shall be paid in in cash.

Sect. 6. The state board of health may, if in their judgment the public health shall require, order any person at any time engaged in the business of slaughtering within six miles of the Faneuil Hall Market in Boston, and not upon any island in the harbor, to slaugh-

ter his cattle, sheep or other animals, upon the premises of said corporation: *provided*, that thirty days' notice of an intention to pass such an order shall be given to such person by said board, and that after such notice is given such person shall have continued to conduct his business in such a manner as in the judgment of the board is injurious to the public health; and the supreme judicial court or any justice thereof, sitting in equity, shall have power to enforce any such order of said board by injunction. And whenever said board shall make such order as aforesaid, they shall also fix in said order the price per head which said party so served with said order shall pay to said corporation for the use of a place in its said building for slaughtering as aforesaid, but said price may be fixed as a certain sum of money, or as a certain portion of the animal, with its blood and offal, and said corporation shall be bound to permit said party to slaughter on its premises on the terms so fixed by the order of said board, unless said corporation and said party shall agree upon some different terms. Any person aggrieved by any order of the board of health, as in this section provided, shall have the right to appeal from said order in the same manner and with the same effect as such right is now given in chapter twenty-six of the General Statutes to a person aggrieved by an order of a town board of health, prohibiting the carrying on of offensive trades. In case of any appeal as herein provided, the application for a jury shall be made to the superior court in the county wherein the party prohibited transacts his business, if in session in said county, or in vacation to any justice of said court. [Approved June 16, 1870.

This Act met with no favor among the butchers. They declined to have anything to do with it. Not a dollar was subscribed to the stock during the subsequent year.

The legislature met again in January, 1871, and in our report it was stated that the persistent opposition of the butchers had succeeded in blocking all progress. The subject was represented as one of great importance, and the danger of having meat from diseased animals sold in our markets was again referred to as one to which we were all constantly exposed.

In April, 1871, the legislature passed the following Act:—

AN ACT concerning Slaughter Houses and Noxious and Offensive Trades.

Be it enacted, &c., as follows:

SECT. 1. Whoever in any city or town containing more than four thousand inhabitants, erects, occupies or uses any building for carrying on therein the business of slaughtering cattle, sheep or

other animals, or for melting or rendering establishments, or for other noxious or offensive trades and occupations, or permits or allows said trades or occupations to be carried on upon premises owned or occupied by him or them, without first obtaining the written consent and permission of the mayor and aldermen, or selectmen of such city or town, shall forfeit a sum not exceeding two hundred dollars for every month he or they so occupy or use such building or premises, and in like proportion for a longer or shorter time: *provided*, that the terms of this section shall not apply to any building or premises now occupied or used for the trades or occupations before described; but no person or persons or corporation now occupying or using any building or premises for the trades or occupations aforesaid, shall enlarge or extend the same without first obtaining the written consent and permission of the mayor and aldermen or selectmen of the city or town in which such building or premises are situated, in the manner provided in this section.

SECT. 2. Whenever in any city or town, containing more than four thousand inhabitants, any building or premises are occupied or used by any person or persons or corporation for carrying on the business of slaughtering cattle, sheep or other animals, or for melting or rendering establishments, or for other noxious or offensive trades, the state board of health may, if in their judgment the public health or the public comfort and convenience shall require, order any person or persons or corporation carrying on said trades or occupations, to desist and cease from further carrying on said trades or occupations in such building or premises, and any person or persons or corporation continuing to occupy or use such building or premises for carrying on said trades or occupations after being ordered to desist and cease therefrom by said board, shall forfeit a sum not exceeding two hundred dollars for every month he or they continue to occupy and use such building or premises for carrying on said trades or occupations after being ordered to desist and cease therefrom by said board as aforesaid, and in like proportion for a longer or shorter time: *provided*, that on any application to said board to exercise the powers in this section conferred upon them, a time and place for hearing the parties shall be assigned by said board and due notice thereof given to the party against whom the application is made, and the order herein before provided shall only be issued after such notice and hearing.

SECT. 3. The supreme judicial court, or any one of the justices thereof, in term time or vacation, shall have power to issue an injunction to prevent the erection, occupancy, use, enlargement or extension of any building or premises occupied or used for the

trades or occupations aforesaid, without the written consent and permission provided in section one of this act being first obtained; and also in like manner to enforce the orders of the state board of health issued under section two of this act. [Approved April 8, 1871.

This Act became operative on the 8th of May, 1871, one month after its passage. Meanwhile the State Board of Health had sent circulars containing copies of the new law to the mayors and selectmen of all cities and towns containing more than four thousand inhabitants, and to the butchers of Faneuil Hall, Suffolk, and Boylston markets. On the 12th of May the Board made an official visit to Brighton and Roxbury, and inspected the slaughter-houses of Messrs. A. Wietz, Dupee, Dyer & Frost, Hollis, Rice, Saunders & Hartwell, Zoller, Taylor, and Jackson, all in Brighton, and the bone-boiling establishment of the Messrs. Ward in Roxbury. After looking at these places, which were taken as fairly representing the beef and mutton butchers and the large and small establishments, it was determined to ask the leading butchers, fat melters, and bone-boilers of the vicinity of Boston to meet the Board at the State House on the 19th of May.

The following are extracts from our records:—

"A special meeting of the Board was held at the State House on Friday, May 19th, 1871, at 10½ A. M.

"Every member was present.

"An address to the butchers of Brighton and other persons, which had been prepared by the chairman and secretary, was read, and adopted unanimously as the opinion of the Board.

"At 11 o'clock a large number of persons, representing the interests of the butchers and fat-melters of Brighton and the vicinity, arrived by invitation of the Board and were addressed as follows by the chairman:—

"GENTLEMEN:—We have invited you to meet us on this occasion in an entirely friendly spirit. We do so in the hope that you and others who may be willing to unite with you for the common good, may be able to attain all the ends aimed at by two Acts, one passed at the last, and the other at the present session of the General Court.

"These Acts have imposed on this Board important duties, and unless you are willing to coöperate with us they must bear painfully on you.

"This Board, as guardians of the public health, brought to the notice of

the legislature what everybody who examines it must admit as an established fact, that the business of slaughtering and of fat-melting as now conducted in this neighborhood is fraught with many evils.

"As the result of our representations, and of a petition brought to the General Court the present winter by the authorities of Cambridge, Medford, Somerville, Watertown and Waltham, a law was passed April 8th, 1871, of which the following is one of the provisions.

(Here was quoted the second section of the act previously given in full.)

"You will perceive from this that the public, represented by the legislature, regards your business as now carried on as needing the attention of the State health authorities.

"In a recent official visit made to Brighton this Board became convinced that the mode of slaughtering there practised is now, and must continue to be, a nuisance until the system itself is changed. The opinion is founded on an examination of establishments of all grades. Every one which we have inspected is beyond all doubt subject to the penalties of the present law. Slaughtering has become one vast nuisance to the inhabitants of the town of Brighton, and to transient travellers through the place. There are so many slaughter-houses scattered about that township that it is impossible to provide any adequate drainage, or the means of carrying away or disposing of the refuse without offence.

"The accumulation of filth about the buildings (unavoidable under the present system) brings as we believe every slaughter-house in Brighton under the operation of the law of April 8th.

"Under these circumstances we wish to draw the earnest attention of those most interested in the matter to the laws of the State, and to our duties as a State Board of Health under those laws. We are certainly bound to see them fully carried out. The legislature, representing public opinion on this question, clearly demand it, and we are prepared to execute our whole duty.

"Your own voluntary acts may relieve us from a grave responsibility. By making a radical change in the system of slaughtering, and by carrying out the provisions of the charter granted last year for erecting suitable buildings for slaughtering and for other operations intimately connected with the business, you will save us a painful duty, and confer great benefit on the whole community.

"Let me again say in behalf of the Board that we meet as friends, and that we hope to have, and we hereby invite a perfectly free expression of opinion on all the questions involved in this important matter."

"The reading of the foregoing paper was followed by a free discussion of the whole question by the members of the Board, and by Messrs. Taylor, Jackson, Ward, Hollis, Dyer, Jordan, Rice, Saunders, Upton, and others.

"After an hour's friendly conference the Board of Health retired, and the gentlemen who had been invited to be present appointed a committee of five who, together with the Secretary of the Board of Health, agreed to go to New York for the purpose of inspecting

the slaughter-houses and fat-melting establishments of that city, on Wednesday, May 24th, 1871."

This committee devoted two days to the inspection of everything to be found in the city of New York relative to the processes of slaughtering, fat-melting, and refuse-rendering. The visit was most instructive. A report of what was seen was made to the State Board of Health by its Secretary. The following are extracts:—

"We followed written directions received from the Metropolitan Board of Health, and it was soon evident that we began with the worst establishments now suffered to exist in New York. Even these, however, had the city sewer directly under them. These slaughter-houses were only tolerable,—what Brighton might be, minus the hogs and plus the sewerage. We moved on, and presently observed a change. A hog-killing place, on an enormous scale, we found odorless, and scrupulously clean. Seven hundred hogs had been killed there the previous night, and not a trace of blood or offal remained. All the blood had been led, by a simple contrivance, from the sticking-pen into casks, five of which we saw at the door of the establishment, ready for removal. This blood is all caught by a fertilizing company, without trouble to the slaughterers, and they pay for it something over two thousand dollars a year. The offal is removed from this place, and from every slaughter-house in the city, once a day, to the New York Rendering Dock. Hog-pens on a very extensive scale, attached to this and a neighboring establishment, were found scrupulously clean,—wonderfully so. Every provision was made for the comfort of the animals. There were excellent arrangements for ventilation. These pens are of great extent, and beyond all criticism in their sanitary plan. There is nothing to compare with them in the neighborhood of Boston.

"The 'Rendering Dock' was undergoing transformation and enlargement, and was in a bad condition for inspection. We found them putting in some new Lockwood and Everett tanks of great size. Two smaller tanks of the same pattern were firing up for the day's work on dead animals and condemned meat from the markets. They burn up the offensive gases, and give out no bad smells during the process; but owing to the change going on at the works, the lesson to be learned at the Rendering Dock was less striking and instructive than when I was there two years ago. The place was also less neat.

"A Jewish slaughter-house for beeves was next visited. We found it rather dirty. The blood is saved in a clumsy and unsatisfactory way. The proprietor told us that he sold the blood to parties who paid him for it $6,000 a year. He also said that he used the Lockwood and Everett apparatus for his tallow-melting, and that he found the process economical, and the product superior in quality to any he had previously made by the open vats or the condensing tanks.

"We went from here to the Butchers' Hide and Melting Company. This establishment extorted admiration from every one of our party. Here were a large number of cattle in pens as fresh and sweet as a model-farm barnyard. Food and water were in abundance. The animals being driven up an inclined plane (paved), reach corresponding smaller pens, equally clean, in which they await their turn. Not a trace of blood or refuse was to be seen, nor was any offensive odor perceptible. Slaughtering was over for the day at the time of our visit.

"Melting-vats were under the same roof; also hide-salting rooms.

"The melting-vats are steam-tight, and the vapors are conducted through iron pipes into the deep water of the East River. Since I visited the place in 1870, the passage of the vapors is aided by a small engine, which forces a stream of water continually through them, serving the double purpose of cooling the gases and promoting a suction from the surface of the boiling fat. The apparatus seemed to be satisfactory. No offensive odor was perceived in the building; but whether any was caused by the escape of gases at the surface of the East River we had no means of knowing. The accounts received relative to this important point were conflicting.* This mode of dealing with the vapors of fat-melting is at any rate only applicable where the supply of cold water is exhaustless; that is, by the water side. The scrap is pressed into solid cakes, and removed to be used as a fertilizer, or for feeding hogs or poultry. * *

"On Friday, May 26th, we went to the Weehawken Cattle Yards, and thence to Communipaw in New Jersey. This great slaughtering place is out of the jurisdiction of the Metropolitan Board of Health. It is now poorly managed, and has retrograded in a sanitary point of view, as every slaughter-house is sure to do unless closely watched. The slaughter-pens are built out over the waters of the bay. Here, as everywhere about New York, cattle are usually killed by being drawn up by the hind legs and their

* A more recent visit to the premises, and a careful examination of the process, lead to the belief that the vapors from the boiling fat are effectually disposed of in the manner described, and are not subsequently perceived in the air.

throats cut. We saw none knocked down, as with us. The Jewish seems to be superseding the Christian method. Blood is saved by putting a tub under the animal's head before cutting its throat.

"Everywhere in New York it was noticeable that the value of blood as a fertilizer was regarded as great. At Communipaw it was particularly evident, and before we left the premises every member of our party seemed to be convinced that the profits there made through the utilization of blood by various processes (about which there was needless mystery) were well worth having. These processes could not be seen in one of the establishments; in another we saw them in part. They seemed to consist in evaporation of the blood to a semi-solid form, and then treating it with dry phosphate of lime and sulphuric acid. The stench during the process was dreadful,* but the resulting fertilizing-powder was no more offensive than guano, and we were told was worth sixty dollars a ton."

On the 8th of June the following communication was received by the State Board of Health:—

[Copy.]

To the Board of Health of the State of Massachusetts: —

The undersigned, residents of the town of Brighton, County of Middlesex, State of Massachusetts, respectfully represent that they are and have been carrying on therein the business of slaughtering animals; and that, acting in conformity with the spirit of the laws relating to the health of the community, and upon deductions from recent observations of the manner in which the business is carried on in the city of New York, made at the suggestion of your honorable body, they are proceeding to make such changes in the construction of their slaughter houses, and such arrangements for the reception, removal, and final treatment of the blood, offal, and all other waste animal matters as will remedy the causes of complaint that may have existed hitherto, and render their places of business unobnoxious to the comfort and convenience of the community. The improvements in the slaughter-houses comprise the laying of tight floors of materials impervious to moisture, and the giving of these floors the required inclination to shed the blood, water and other matters, into suitable vessels provided for their reception and daily removal from the premises. The vessels will be made of material impervious to moisture and kept perfectly clean and sweet. They

* It will be seen presently that by a new process blood can be converted into a valuable fertilizer without any offensive odor being given off during the operation.

are providing also for the use of a sufficient supply of water for cleansing the floors and vessels, and the most efficient antiseptics and disinfectants as supplementary agents of purification. Of these, carbolic acid, chloride of lime, sesqui-chloride of iron and lime will be chiefly relied upon; and these articles will be employed faithfully.

The greater or lesser quantities of putrescent matters which may have been suffered to accumulate upon their premises will be deodorized and their putrefaction arrested by means of the agents above named, and covering them with peat or charcoal or other material in case these should lack efficiency. During the coming winter, these accumulations shall be removed, after incorporation with enough deodorizing material for the complete removal of their offensive odors in the process of handling. By means of these improvements and agencies, the undersigned are fully convinced that, with respect to the putrescent accumulations, and the offal and ordure from the current business, their premises will be kept quite clean and sweet. But if, after the most thorough use of them, which the undersigned promise earnestly and sincerely to make, their premises should still be obnoxious to a due regard for the comfort and well-being of the community, or reasonably unsatisfactory to your honorable body, they will have to submit without complaining to any regulations your honorable body may lawfully impose; and they would be glad to consider now any suggestions you may be pleased to make as to the conduct of their business upon their own premises, if it should appear that what they purpose to do will prove inadequate. To take care of the blood and offal from the current business of slaughtering, from which alone a nuisance can arise, after the above detailed painstaking with the slaughter-houses, the undersigned contribute largely of their means toward the establishment of the Massachusetts Chemical Company for converting and utilizing animal substances, whose plan of operation, with all other needful particulars, will be submitted for your approval; and the undersigned will not remark upon this company further than to say that it cannot, with its ample capital, skill and experience, fail of the desired end.

In respect of the blood and offal produced before this company shall be ready to manufacture, the undersigned have made such arrangements as must, they think, be satisfactory to all concerned. The particulars of this arrangement also will be communicated to you by the agent of the company. In conclusion the undersigned pray your honorable body to consider that the business of slaughtering has been carried on for many years in the town of Brighton; that the manner of doing it has become somewhat settled dur-

ing this long period, rendering slow of accomplishment radical and wide-spread changes; that it forms the principal business of the town, and has given the town its prominence amongst the towns of the Commonwealth; and that it ought not to be interfered with detrimentally unless the public good imperatively demands it.

To the butchering fraternity and those connected with them (constituting a large proportion of the aggregate population) whose operations have been centered here from the time when the town had comparatively few inhabitants, the manner in which the business has been carried on (with some admitted exceptions of time and place) has not been more offensive than the same is found to be in other places generally. The undersigned have no evidence whatever that it has been deleterious to health, though they freely admit that with the increasing density of population greater care should be exercised. They beg to remark, however, that since the healthfulness of the town has not been impaired, but the sense of smell merely, and that only occasionally, offended, the increment of population coming to the town fully aware of the kind and extent and method of its chief business have not a cause of complaint so well founded as to justify the compulsory abandonment of the property of the undersigned and the discontinuance of their business or its immediate consolidation under a plan which does not meet their approval; especially just at a moment when, yielding to their own convictions of the present need of some modification, under the pressure of an increasing population and growing intimacy with the adjoining towns, they are making due effort to obviate or remove every cause of complaint.

It remains, then, with your honorable body to determine, in the exercise of a wise discretion, whether the undersigned shall be allowed to go on with their plan for the immediate purification of their slaughter-houses, and the future proper care of the refuse animal matter, and thus utilize the information gained from the visit of their committee to New York, made at your instance, and exhibit their sincerity in the representations made herein; or whether their places of business shall be summarily and indiscriminately closed, their individuality in business destroyed, a serious blow given to the large slaughtering interest, and the community deprived of the benefit of the competition in the trade which it now enjoys, but which cannot exist so well, if at all, under a system of consolidation and coöperation.

(Signed by sixteen of the leading butchers of Brighton.)

Brighton, June 8, 1871.

These proposals met with no favor from the Board. The radical defects in the proposition were as follows:—

1. The impossibility of draining the present slaughter-houses.
2. The impossibility of "cleaning up" the old buildings, whose materials, and even the soil on which they stand, are thoroughly and hopelessly foul
3. The objection to carting offal and blood through the streets.
4. The absence of any additional security, by inspection, for the quality of meat furnished to the public.

The advantage of such an arrangement to the butchers, in giving them opportunity to save the value of offal and blood, was evident, but there seemed to be no corresponding advantage to the public. The plan was unsatisfactory to the State Board of Health, and from this and other causes was abandoned.

Meanwhile, the operation of the slaughter-house law began to be felt in Brighton. The Board was advised by the attorney-general that, although it might summon the occupants of establishments known to the Board to be offensive, to show cause why they should not be closed, it would be safer to act only on complaints brought before them by third parties. In one respect this restriction was a subject of regret, inasmuch as it seemed probable that it would result in complaints being made against those who were least rich and influential in their respective neighborhoods.

The actual number of complaints received concerning slaughter-houses, and the decision in each case, may be seen by reference to the General Report of the Board, page 2 of the present volume.

In April, 1871, a death occurred in Brighton which served to fix public attention upon the evils and dangers inseparable from the methods of slaughtering there practised. George E. Temple died from the effects of a slight cut or scratch received while dressing an ox which had died from disease, and it was proved at the inquest on Temple's body that half of the diseased animal was conveyed to Boston to be sold as food in the public market. People began to wonder whether they had

eaten of this particular beef, and if they were liable to eat similar beef at any time. There was much wholesome alarm. An inquiry was instituted by the city council of Boston, and the dangers to public health from the sale of unsound and diseased meats received a searching investigation at the hands of a joint committee of the aldermen and common council appointed for the purpose. During the month of May there were many sessions of this committee, and the witnesses examined gave evidence of the most conclusive character, all going to show that the public had no guarantee of the quality of the meat they purchased. Animals which had died in the railroad trains from overcrowding, abuse, want of food, or other cause, and animals which had died from disease in Brighton or the neighborhood, were liable to be dressed for the market in the slaughter-barns, and the meat sent to Boston for sale. It was testified that all this had been done in repeated instances. The principal witnesses to prove the facts were those engaged in the business. The testimony of physicians was also given, and they were all of opinion that the remedies for these evils were to be found in a concentration and supervision of the slaughter-houses. The Secretary of the State Board of Health gave evidence that the recognition of meat from animals dead from disease was so doubtful a matter that neither physicians nor butchers could make a decision with any approach to certainty; that to be sure of the health of animals furnishing meat, inspection during their life was required; and that in the forty closed and detached barns now used for killing at Brighton, such inspection was impossible.

A final report of the committee of the city councils of Boston was made in September, and was printed in a pamphlet of ninety pages, giving all the evidence *verbatim*. It is a complete examination of the subject of the sale of unsound meat in the Boston markets, and is of great value.

After the compromise proposed in the letter of June 8th was seen to be out of the question, affairs at Brighton began to wear a more promising appearance.

The hearings on complaints made to the Board continued through the summer, and it seemed not improbable that all the slaughter-houses in that town would be ordered to be closed. No one could fail to see that the State Board of Health was

thoroughly in earnest, and would carry out to the letter the duty with which they had been charged in the Act of April 8th.

This, however, was by no means the only reason, or perhaps the principal reason, for a change of feeling on the subject in Brighton. The plan of reform had been thoroughly discussed, and the more it was talked about the less objectionable it looked.

There had always been men engaged in slaughtering who knew that the time must come when population would so increase that a change in the way of transacting the business would be needful. Then why not make it now?

The butchers were being educated up to the point of seeing that their processes were not as good in some respects as were used elsewhere. The visit to New York had convinced every butcher in Brighton that the plan of throwing offal and blood into pens, to be eaten by hogs, was a wasteful proceeding. The value of land for dwellings was every day increasing, and the agitation of this question of slaughter-house reform had probably contributed to the very great advance now perceived.

All these and doubtless other considerations had their weight to overcome the repugnance with which legislation against what were regarded as rights of property was at first received. It is surely not to be wondered at that the people's right to pure air and wholesome meat should not be immediately allowed by men who knew they were only conducting a lawful business in precisely the same way that it had been carried on for a century. It is not surprising that very hard feelings were entertained towards our Board, whose business it was to faithfully execute the law of the State. But gradually the belief that every body would gain and nobody would lose by the proposed reform made steady progress.

During the past three months many meetings have been held by the butchers of Brighton to consider the question. Committees have been appointed to examine all its details. The result of all this has been that the charter for the "Butchers' Slaughtering and Melting Association," granted by the legislature in 1870, has been accepted.

The butchers and the State Board of Health are now working together for the common good, and all parties are interested

in completing the arrangements for slaughtering and rendering under the new system with as little delay as possible.

Such changes cannot be made in a moment. They require deliberation, a regard for the rights of property, and a careful consideration of many details of construction. The Board had, in anticipation of what has now come to pass, collected information concerning all the great European abattoirs, and made some preliminary plans adapted to American use, all of which are now at the service of the association, and will aid them in the great work they have undertaken.

More than a hundred thousand dollars (the sum required by the charter), has already been paid in cash to the capital stock, and it is understood that a very much larger subscription can be had when required. The association has been organized by the choice of twelve directors, who are the leading men now engaged in slaughtering for the Boston market.

A very large tract of land on Charles River, just below and opposite the U. S. Arsenal, has been secured for the use of the association, and the location has been approved by vote of our Board, as the law requires. This land has good facilities for drainage, and is so placed between the tracks of the Albany Railroad and the Watertown branch of the Fitchburg Railroad, that animals arriving by these two great lines of supply can be landed, in the one case directly on the ground, and in the other within half a mile.

Here will centre in the future a business of great magnitude, whose influence on the public health and welfare cannot fail to be good,—where it will be shown, as we believe, that slaughtering can be done without offence to any one,—where animals can be readily inspected before being killed, and the purchaser thus guaranteed wholesome meat,—where the fats and the hides can be immediately treated by safe methods,—and where all animal refuse can be converted on the spot, while yet fresh and untainted, into a fertilizer free from offensive smell, and of great commercial value.

All this direct and positive good will quite surely come from the new establishment. But this is not all. Order will take the place of disorder. Violence and brutality will be discouraged. We shall no longer see, in the heat of midsummer cattle and sheep left without shade, or food, or water.

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The inspection of animals at the abattoir will tend very strongly to check the horrible treatment which they now so often receive on the railroads, since no animals not in health can be killed.

This inspection will operate, by the strongest of all motives, as an incentive to good treatment of the animals before they reach Brighton from any quarter.

There will be an end not only of the dressing for the markets of animals arriving dead, but also of the "killing of animals to save them" from speedy death by disease.

The Brighton slaughter-house hog will disappear, or will get more wholesome food than he received from the putrid blood and entrails of other beasts.

But the advantages to flow from the abattoir will not stop here. There are, all over Massachusetts, in cities, and towns, and villages, slaughter-houses and bone-boiling and fat-rendering places which are nuisances,—Brightons on a smaller scale, but offensive in the same way—and which good-natured people have borne with, as evils which must of necessity be endured because they could not be cured.

If it can be proved at Brighton that there are methods, both economical and inodorous by which these trades can be conducted, it will be a lesson whose good effects will be perceived far and wide.

What these plans and processes should be at the Brighton abattoir it is yet too soon to explain in detail. But the general principles on which they must be founded are, order or system, and the prevention of putrefaction.

As regards *slaughtering*, whether at Brighton or elsewhere, there are needed building materials impervious to blood, abundant water supply and drainage, and the means of putting every part of the slaughtered animals into a form which will not decompose, *each day*.

As regards *bone-boiling and fat-melting*, if the material to be used is fresh, and unchanged by any taint of decay, the vapors coming from it can be condensed in water, and there are several available plans for doing this without offence, if water is abundant and drainage complete.

If, however, the material is tainted, as is certain to be the case in the waste animal matter collected in a large city, there

is no process known to us by which the complex gases thus combined with watery vapor can be destroyed, except by fire.

This mode of dealing with them is effectual—and apparently the only conditions for success are, the having a fire so hot that the watery vapor may not put it out, and delivering the gases at a high temperature.

It is claimed that whoever burns up the gases generated by boiling animal matter must pay a royalty of fabulous amount, but we canno believe that there is any such royal and exclusive road to safety and convenience. Such claims bring all patent laws into disrepute, and would hamper the chemist in the common workings of his laboratory, or even the cook in her kitchen.

But after the "rendering," or the process by which the fats are liberated and the greater portion of the water driven off is completed, there still remain the scraps, or tankings. These scraps have justly had a bad repute everywhere. If not foul when scraped out of the vats, they soon become so. The object has been at all rendering works in crowded neighborhoods to be rid of them at any price at once, as too foul to be dealt with on the spot. They have been usually carried off to some remote place for conversion into "phosphates," and before reaching there, in summer, they swarm with maggots. In this condition they were seen at Communipaw, last May, piled up in barges.

The tankings from the rendering of partially decomposed animal matter is the source of a great part of the vile odor which surrounds bone-boiling and phosphate-making establishments. The smell can indeed be kept down by the use of powerful disinfectants, like carbolic acid, but it costs too much to use them.

The tankings have been usually treated with bone-coal and sulphuric acid, thus converting the phosphate of lime into a material chemically like gypsum or plaster of Paris, and liberating phosphoric acid to form a new combination with the ammonia of the decomposing meat. Ground oyster shells are often added to the mass, which finally becomes a powder like guano, but meanwhile emits an odor which has made phosphate-factories, wherever placed, a stench and a nuisance.

By a new process, the success of which seems to be proved,

a similar result is reached without offensive odor, and a fertilizing powder worth $40 or $50 a ton is produced from "tankings," and also from blood, without the addition of chemicals, in the space of one or two hours. This method will be used at the Brighton abattoir, and by means of it, the blood and offal of all the animals slaughtered each day will *in the course of the same day* be reduced to the form of a simple and inodorous powder.

This new and valuable way of treating scrap and blood is, in so far as we have been able to learn, a great improvement upon any method heretofore used either in this country or in Europe. It is effected by a rapid evaporation of the water which is combined with the substances, together with a gradual breaking up of the mass by continued movement. The machine by which this is accomplished consists of a double horizontal cylinder, fifteen feet long and about five feet in diameter, having a hollow shaft, from which project hollow arms, running through its whole length. The materials to be dried, whether blood, or tankings, or any similar substances, are dropped into the inner cylinder by an opening, which is then securely closed. Steam is now introduced into the annular space (an inch or two wide) between the outer and inner cylinders, and into the hollow shaft and arms, which are made to slowly revolve. A current of air, heated by passing through a small furnace, is also blown in at one end of the inner cylinder and passes off at the other end. The contents of the inner cylinder are thus rapidly dried by the high temperature to which they are exposed, and by the current of hot air passing through them, which greedily absorbs the water and blows it off in a cloud of vapor. Meanwhile the revolving arms, and a scraper which is attached to them, have broken up the mass and reduced it to powder. In two hours or less the cylinder is opened on its under side, opposite to the opening by which the refuse matter was introduced, and it falls out, like meal from a grist-mill, dry and ready to be packed in bags. This process was witnessed by a committee of the Butchers' Association, and the Secretary of the State Board of Health, at New Haven on the 22d of December last.

The machine was new, and it was its first trial. The materials operated on were first, *tankings*, of which 1,200 pounds in

a very foul state were placed in the cylinder; second, *blood;* third, *fish scrap.*

All these experiments were satisfactory, notwithstanding the fan for blowing hot air through the mass did not work efficiently owing to some trifling defect in its arrangement.

This method of reducing refuse nitrogenous materials to a form in which they can be made ready for use as plant-food without the intermediate loss of ammonia is surely of great value, and the only wonder is, as with so many other simple improvements, that nobody ever applied it before.

If it can be shown at Brighton, as we believe will soon be done by the Butchers' Slaughtering and Melting Association, that the foul odors which have been thought to be inseparable from slaughtering, bone-boiling and fat-melting are avoidable, and that in the final treatment of refuse animal matter the ammoniacal products of decomposition, instead of being wasted to pollute the air, may be saved to enrich the earth, it will be a sanitary and economical demonstration whose good effects will not be limited to Massachusetts.



VEGETABLE PARASITES

AND THE

DISEASES CAUSED BY THEIR GROWTH UPON MAN.

By James C. White, M. D.

1. The Nature of Vegetable Parasites.

2. The Diseases to which they give Rise upon Man.

3. Pseudo-Parasites.

4. Their Growth upon the Domestic Animals.

5. Their Supposed Identity, and their Relations to Common Moulds.

6. Common Sources of Contagion, and Precautions to be Used Against Them.

VEGETABLE PARASITES.

1. *The Nature of Vegetable Parasites.*

The question of the occurrence of low forms of vegetable life upon the external surface of man at times, and of alterations in the tissues of the skin and its appendages in connection with, or in consequence of, their presence there, is no longer a matter for discussion; it is a fact as well demonstrated as the growth of the lichen upon tree and rock. Concerning the botanical position of these forms, however, their absolute connection with some of the affections in which they are found, the identity of the different varieties, and their relations to the common moulds of decay and fermentation, there still exists a great difference of opinion in consequence of lack of knowledge on these points. The purpose of this paper is to present some account of what is known about vegetable parasites and their effects upon the exterior of man and other animals, and of the present state of information in relation to that part of the subject which is still a matter of theory and under investigation.

At the foot of the vegetable kingdom there exists a large family of so-called cryptogamous or flowerless plants, the fungi, among which the forms under consideration are generally placed, although there are recent writers who would give them a still lower rank in the scale of creation, and, on account of their marked dissimilarity to plants in most respects, would make of them an entirely independent group of organisms. Like many of the moulds, nothing can be learned of their structure by the unaided eye, and in some cases even their existence can only be determined by the high powers of the microscope.

Examined by this instrument, the growths in question are

found to consist of elongated, extremely slender, thread-like cells or tubes, more or less branched or intertwined, and divided transversely by partition walls here and there. This, the nutritive or vegetative part of the fungus, is called *mycelium*. It may increase directly by subdivision into cells which have also the power of branching and self-multiplication, or by the production of innumerable, minute spherical or ovoid cells at the ends of certain of its branches, either enclosed in capsules called sporangia, or growing in bunches or bead-like chains, when they are called *conidia* or *spores*. These conidia, when detached, may be found single, united in rows, or divided into compound cells, and each of these is capable of reproducing the mycelium in turn. If these cells or the mycelium be placed in a liquid under proper conditions, their substance, or plasma, as it is called, becomes cloudy and subdivided into innumerable and infinitely small, free cells, which have the power of multiplying by self-division again, and which are either motionless or exhibit peculiar movements among themselves. One of these forms is called *micrococcus*, a term applied not only to what is really known to be the most minute and elementary form of fungus growth, but to much else of indefinite character in the shape of granules detected universally in matter under certain conditions by the highest powers of the microscope. The term is strictly applied to the more or less spherical cells or points,—those which are somewhat elongated and swollen at one or both ends being called bacteria; while those united in minute chains are called vibriones. These are supposed to be the primitive forms of organic life, and are of late much and loosely referred to in the discussions upon the germ-theory of disease. As a phase in the life of the parasitic fungi they claim our attention here.

Placed in suitable fluids these infinitely small cells develop into other and much larger cells of various shapes, which are found either single or united in rows with lateral branches, which increase by budding, and may assume an elongated form like mycelium. They are the submerged form of fungus life, and are known as ferment cells, of which the beer or yeast plant, the wine and vinegar plants, and the milk ferment are well-known examples. This form is capable of reversion to the micrococcus, or under more favorable circumstances probably of attaining to the higher mycelial and conidial development

above described. It is a form of special interest from its close resemblance in shape and size and manner of growth to the spores which form by far the greater portion of the fungus growths parasitic upon man, but which are regarded rather as sterile mycelial elements. The forms which demand our attention, therefore, are, to repeat, the cell-like spores or conidia, the tube-like mycelium, and the mycrococcus granules.

These are the forms which make up the structure of the moulds, and the varying predominance of some one or more of these elements, their shape and size, constitute the only distinguishing features formerly recognized among them. Such variations were generally regarded as specific characters, and upon such views mycological systems have hitherto been based, but recent observation has shown that such a system of classification is wholly wrong; that moulds assume a great variety of forms according to the nature of the soil and the atmospheric condition under which they grow; and that many of the most common of those formerly recognized as distinct species are but varieties of some one well-known individual, prevented from attaining their perfect development by the circumstances of their position. Such tendency to variation has been termed Pleomorphism, and must be farther considered in connection with some of the questions above referred to. It is enough for our present purpose to recognize the possibility that the simple spores and mycelium, which make up almost wholly the growth of the vegetable parasites under consideration, are not the only or highest phase of development of which they are severally capable, and that under other conditions they might present appearances so unlike these as to have no apparent connection with them.

The important part which these humble forms of vegetation play in the economy of nature may only be briefly alluded to here. The processes of fermentation by which fruits and cereals are converted into wines and beer, and these in turn into vinegar, by which the sugar of milk is changed to lactic acid, and many other transformations by which new chemical products are obtained, are exhibitions of their influence over the metamorphosis of matter. They are the active agents, too, in those less obvious changes by which dead matter, so called,

is resolved int its ultimate elements and converted into a state best fitted for the support of future vegetation.

But it is not wholly upon decaying, or at the expense of inanimate objects, that fungi flourish, nor are the results of their operations always as beneficial as those just mentioned. The existence of the destructive wheat bunt and rust, and of the poisonous ergot of rye, the disastrous disease of the vine, the potato rot, and the dry rot of the hardest oaks, show how such insignificant creations may change the destiny and destroy the health of nations. They prove too that fungi may attach themselves to, and live at the expense of, the living tissues of other plants, and, as Berkeley says, although they may not prey upon cells full of vital energy, life is so depressed by the presence and contact of tissues already diseased, that the healthiest soon fall victims to the deadly encroachment of the spreading mycelium. Upon the higher organization of animal life, too, we find the same destructive agencies at work. The domestic fly glued to the window-pane, and surrounded by its pall of white spore dust, oftenest calls our attention to this fact, and the muscadine of the silkworm has been as destructive to large manufacturing districts in France as the oidium to the celebrated vineyards of Madeira. The well-known spheriæ of New Zealand, objects apparently dried plant at one end, dried caterpillar at the other, furnish another instance of the mastery of their living host by fungi. Such victories of the vegetable over animal life, and the seeming metamorphosis, are foreshadowed by the fabulous transformations of Clytie and Daphne.

The effects which fungi produce by their presence upon the surface of man are never fatal in character or in any way injurious to his constitution; they are, however, the cause of serious deformity and discomfort, as will appear in the following account of the several affections in which they occur. The number of these diseases has been constantly changing since Schoenlein in 1839 first recognized the cryptogamic character of the crusts of Favus, according to the discoveries of observers and the varying views which writers on these subjects have expressed from time to time. There are those who profess to believe in the impossibility of a plant's attaching itself to animal tissues under any circumstances; but such an opinion, as stated at the beginning, requires no notice, as this part of the

question is settled. There are others who, from the fact that the spores of various fungi are occasionally detected in the effete scales of Psoriasis, the crusts of Eczema, and in other cutaneous diseases, the non-parasitic nature of which no one questions, claim that their presence in all other cases is equally insignificant. Such a conclusion is as unsound as would be that of a botanist who should deny the cryptogamic nature of the various parasitic growths upon the forest tree, because the crevices of its bark catch and retain the scattered spores which the wind is always sweeping through the air. Then there are certain affections in which fungi have been discovered by some, and not recognized by other reliable observers; the former maintaining that the plant is the cause of the abnormal appearances which constitute the disease, the latter that it is only occasionally and accidentally present. Great difference of opinion prevails therefore with regard to the position of several of these affections, not only as to whether they are to be considered of parasitic origin, but as to their mutual relations among those who claim the latter.

On the other hand, there are three well-marked and important affections of the skin and its appendages which reliable authority universally admits to be produced by the presence of fungi upon and within their tissues, and these will be first considered. They are called Favus, Herpes tonsurans, and Pityriasis versicolor.

2. *The Diseases to which they give Rise.*

FAVUS.

The first of these, Favus, is the one in which, as already stated, the existence of a vegetable parasite was first recognized. It may be briefly described as an affection of the scalp and external covering, characterized by the formation of large, yellow crusts. The shape of these crusts is peculiar, being concave upon their upper and exposed surface, circular or ovoid in outline, and presenting concentric rings rising like the seats of an amphitheatre from the central depression towards the elevated margin as they increase by peripheral growth. In size they vary from a minute point scarcely discernible by the naked eye to flattened masses a half inch in diameter when separate, and an eighth of an inch or more in elevation above the surface of the skin at their edges. Distinct crusts may by confluence, however, form large patches in which their

characteristic concavities may be more or less blended and lost. These peculiarities of shape are caused by their seat and the method of their growth. The minute elements of the fungus gain entrance to the tissues of the skin upon which they thrive through the opening of the hair follicle, and from this as a central point extend downwards into the hair canal, and outwards in all directions into the epidermis. At first a minute globular mass is formed, but as the growth increases peripherally it is held down at its centre by the clinging of the hair-sheath to the hair, while in the free epidermal tissues around it is allowed an upward growth. It is the presence of the hair in the centre of each crust, therefore, which mainly causes the concavity of the crusts. Upon the scalp where the hairs are best developed this shape is longest retained, while upon the general surface of the body, where it is much less frequently met with, the crusts when large wholly lose this peculiarity and form irregular-shaped masses projecting to a much greater elevation above the surface. If we remove one of the small and perfect crusts, which is easily done by the nails, or a blunt instrument, we shall find its under surface convex, and that it is seated upon a smooth and shining depressed surface, which soon rises again to the level of the surrounding skin, and reproduces the crust. The color of the crusts when young is bright orange, fading to a pale lemon color when older. The odor is disagreeable, resembling, as it is thought, somewhat that of mice, a significant fact in connection with its frequent occurrence upon these animals. These appearances may be modified by the bursting of the crusts by rough handling and the discharge of their contents, or inflammation may arise beneath them from the same cause, and the pus and blood mingling with them give rise to the formation of large scabs.

There is a stage, however, in Favus, preceding the appearance of the crusts, which is generally overlooked, and which strongly resembles the appearances peculiar to the disease next to be described. This is best studied by observing the effects of inoculation upon portions of skin not covered with hair. This is most successfully accomplished by enlarging the openings of hair-follicles by a needle, and applying to the punctures a drop of water containing favus particles. In a few days a red spot is noticed which is somewhat scaly upon the surface, and increases in size, apparently healing in the centre, as it spreads outwards. Sometimes groups of small vesicles or papules may be seen within the patch. These appearances, so strongly resembling ringworm, may last three or four weeks, and disappear without the production of a true favus crust, if the growth should not chance to enter the canal of the hair follicles

seated within its border; but generally minute masses of the characteristic yellow color may be seen, or characteristic favus cups are formed after a while. This early stage is rarely noticed upon the scalp for two reasons: it is concealed by the hairs when present, and the larger development of hair there leads to the more easy and rapid formation of the crusts which obscure it. Favus is so rarely seen upon other parts than the scalp, that this stage is little understood, and when observed has been without doubt mistaken for ringworm in many instances. This error, or an occasional chance coincidence of the two affections upon the same ortion of the skin, has given rise to the opinion, held by some dermatologists, that the fungus is the same in both diseases. This is a question, however, which will be considered further on.*

* During the preparation of this paper I have been watching upon my own arm the growth of the favus fungus, inoculated according to the method of Peyritsch.

On November 2d, material from a favus crust, removed from a patient in the skin ward of the Massachusetts General Hospital was rubbed up with a little water so as to form a thin paste. This was smeared over a portion of the fore-arm, where the openings of four contiguous hair-follicles had been just previously enlarged by drilling into them with a needle. An inch above this spot a needle loaded with the same moistened favus matter was bored into three hair follicles also. The parts were then covered with a piece of cotton cloth, and sticking plaster was applied over all.

November 4th.—The follicles thus treated were red and slightly elevated.

November 7th.—Appearances as on 4th.

November 13th.—Follicles of the upper patch much more swollen than those of the lower, and the skin surrounding both points of insertion reddened.

November 20th.—Follicles of upper patch still more prominent than the others, and the skin surrounding them, half an inch in diameter, considerably swollen.

December 7th.—The dressings, which up to this time had been only momentarily removed for inspection, were not replaced, and the parts were covered simply by the ordinary clothing. Both patches were red and covered with yellow, scaly matter, the borders being somewhat elevated and papular. Some of this matter was scraped off, and the parts were then washed for the first time.

December 11th, four days after washing.—The surfaces of both patches have become covered again with yellowish-white scales, and two of the follicles in the upper patch are quite prominent.

The scaly matter removed from the surface was examined by the microscope, and presented the following appearances: The epithelial cells, of which it mainly consisted, were filled with groups of fungus cells, resembling in all respects those of achorion, and quite unlike those of the parasite of Tinea tonsurans. A very abundant growth of mycelium was also seen running through the masses of epithelium in all directions. One of the lanugo hairs from the patch was also removed, and, after maceration in a solution of potash, was found to be permeated by favus cells throughout.

December 27th.—The parts are still unchanged, except that they are less red beneath the scaly surface, and the elevated margin has flattened down to the general level of the skin. The spots have not enlarged, and no true, characteristic favus cup has formed. They would not be generally considered as favus, if seen without the above knowledge of their history, and they might easily have been mistaken for ringworm.

February 20th.—The skin of the above parts has returned to its natural appearance. The fungus did not succeed in establishing a permanent hold upon the tissues.

Such are the appearances produced by the growth of the favus plant upon the human skin; the effects and symptoms to which it gives rise need but a brief mention. Upon the general surface of the body it causes various degrees of irritation, sometimes sufficient to excite an eczematous condition of the surrounding skin if scratched, or some immobility of the joints of the limbs, if there seated; but generally its presence is productive of little inconvenience. Upon the scalp, however, its effects are of a more serious nature. The hairs soon begin to change in color, becoming gray or white, lustreless, stiff and brittle, and after a while break off at the surface, or are discharged by suppuration with the surrounding favus masses. In this way the disease spreads over the whole scalp in time, the baldness beginning generally at the front and lateral portions, while the hair upon the occiput may retain its position for years. The baldness may be temporary only, in case the hair follicles are not destroyed, but the presence of so much foreign matter within them may give rise to so violent an inflammation that they and the hair-growth are forever destroyed. In this way the firm, white and atrophied condition of the scalp is produced so characteristic of old cases of favus. In some instances atrophy of the bones of the skull even, has been observed. It will be easily understood how, by combing and scratching, or by self-rupture of the crusts, and by the changes of position in the bandages worn to conceal its presence, favus-matter may be transplanted from one part of the scalp to another.

Upon the constitution and health generally favus has little or no effect. It is often seen upon sickly-looking and consumptive children, but such coincidence indicates only neglect most favorable to the progress of both the local and general affection. It may possibly thrive more vigorously upon the devitalized tissues of a person debilitated by consumption, but its alleged connection with this disease or dependence upon hereditary or constitutional predisposition, rests upon no proper foundation.

Favus affects the nails too occasionally; generally in persons either carrying the growth in some other position, or having charge of those affected by it. Their substance, which is only modified epidermal tissue, becomes yellow and opaque, their longitudinal striæ are more marked, and their surface has a rough and tuberculated appearance. The external layers of cells are easily detached, and are found filled with the parasitic growth, while sometimes a well-defined favus mass perforates the nail from below.

If now we examine by the microscope the matter of which the

favus crust is composed, upon whatever part of the body it may be growing, we shall find in addition to more or less epithelium, 1st, innumerable, minute cells of an irregular ovoid shape, attached to each other in groups or rows, of about the $\frac{1}{3000}$ of an inch in diameter; 2d, others more or less swollen at one end, or divided or branched; 3d, long and very slender tubes extending from the masses of cells, and more or less subdivided by partition-walls and branched; and 4th, granular matter so small as to be without definite form, even when examined by the highest powers. These objects constitute, it scarcely need be said, the elements of a fungus as already described. The first two forms are the spores or conidia, the third is the mycelium, and the last the micrococcus. They are not distributed evenly throughout the favus mass. The spores predominate in the centre of the cup, while the micrococcus and mycelium are found more largely at its circumference and extending into the surrounding epidermis, which holds it encapsuled. The cells of the skin, in the earlier stage of the disease above described, and likewise the outlying portions in the neighborhood of the crust when formed, will also be found to contain the same elements, although the spores are in much smaller proportion. If we remove the hair which pierces the centre of one of the cups, with its sheath attached, we shall find the walls of the latter distended with innumerable spores and mycelium shooting out into the surrounding tissues. If the hair be one sufficiently long affected to present to the eye the appearances already described, it will be found when examined by the microscope, after maceration in a solution of potash, to be permeated by hollow canals running lengthwise between its fibres, and by beaded tubes extending longitudinally throughout its substance. Rows of conidia may also be seen encircling the shaft of the hair. These appearances are to be traced from the atrophied bulb for a considerable distance after the hair emerges from the skin.

The fungus growth in the nail is the same in all respects as in the epidermal tissues elsewhere. The fungus in favus has always hitherto been called achorion schœnleinii, in honor of its discoverer. Whether it is still to be looked upon as a species peculiar to this disease, as identical with those found in the other parasitic affections of the human skin, or as only a modified form of some common mould, are points to be considered farther on.

Favus is a rare disease in comparison with the affections remaining to be considered. It is mostly met with upon the heads of poor children, for its elements seldom succeed in developing upon surfaces frequently washed or brushed. Although positively con-

tagious, it is so in far lower degree than some of the varieties of ringworm to be described, and it seldom if ever runs through schools and asylums like the latter. It is frequently observed upon several members of the same family, however, and to be developed successively and only after long periods of daily contact amongst its individuals. Its artificial transmission by inoculation is also a matter of difficulty, although recent attempts performed by puncturing the hair follicles for the admission of the fungus have been much more successful than when other methods were used. It affects children more frequently than adults, and is comparatively more common in the country than in cities. Its course is always slow; left to itself it may last a life-time upon the scalp, or until it has entirely destroyed the hair, in which case a spontaneous cure is possible. Upon other portions of the body its duration is by no means so chronic, and its eradication by treatment, compared with its seat upon the scalp, a simple matter. The same happy result might be obtained there, did not the hairs which pierce the crusts retain them in position, and also contain a store of seed which continually gives rise to new life. It is on this account that favus upon the scalp is one of the most obstinate affections known.

RINGWORM.

Under this general name will be described certain diseased conditions of the skin of various parts of the body, so unlike in their appearance as to have been considered distinct affections up to very recent date, and to be still called by different names, and to be the subject of more animated discussion at present, perhaps, than any other point in dermatology. Ringworm of the scalp, called herpes tonsurans or tinea tonsurans; ringworm of the general surface of the body, called herpes circinatus; ringworm of the beard and sycosis, both called "barber's itch" at times, as well as by other names; eczema marginatum, a peculiar affection of certain parts of the body, so called by Hebra in his original description; and the majority of the cases of parasitic disease of the nails, called onychomykosis, are all caused by the growth of one and the same fungus, hitherto generally entitled trichophyton tonsurans. The great dissimilarity in the appearances of these affections is due, as we shall see, mostly to peculiarities in the seat and stages of the parasitic growth.

Ringworm *of the general surface* of the body is familiar to all. It begins as a red spot, slightly elevated above the surrounding skin, which is covered in a few days with minute papules or vesicles of very short duration, or with little white scales. It increases

rapidly in size, flattening down in the centre as it expands, so as to form a circular patch, the elevated border of which consists of a ring, an eighth or a quarter of an inch in width, of the same papules, vesicles, or scales, while the central portion appears red and scaly. Thus it goes on sweeping outwards like the cryptogamic fairy ring upon the soil, and forming complete circles sometimes six inches or more in diameter, which then appear as rings simply, as the redness and scaliness of the enclosed skin disappear after a while. Sometimes, however, the disease starts up afresh within the district already swept over, and rings within rings may be formed. Generally, after reaching any considerable size the disease dies out at certain portions of the border or rim, for want of proper nourishment or suitable soil, and segments more or less broken are left to advance over the uninvaded regions of the skin. Generally, too, new spots appear before the disease has lasted long, the result of self-inoculation, which run the same course. Their seat is most commonly the neck and face, or these are the parts generally the first to be affected from their greater exposure, but the whole surface of the body may be more or less successively swept over before the disease is exterminated, or may exhibit simultaneously the characteristic marks of its presence. When about the face and neck in children it may extend its march to the scalp, and thus give rise to one of the other varieties already mentioned; or in a man it may run through the beard and cause there similar appearances to those upon the scalp of children, or terminate finally in another form, sycosis. It may, however, affect the hairy portions of the face or scalp and for a considerable time, and yet manifest itself in no other way than by the formation of the rings already described. In the latter case the hair follicles have not become implicated, and thus the appearances and course of the disease remain the same as upon non-hairy portions of the body. Occasionally these varieties may be seen simultaneously upon one person and their conversion into one another satisfactorily observed. The sensations which accompany them are more or less itching and burning.

If some of the scaly matter be removed from any portion of the skin affected by ringworm and examined by the microscope, there will be seen mixed with epidermal cells innumerable round bodies $\frac{1}{7000}$ of an inch in diameter arranged in groups and rows, or single, and, sparingly interspersed, long and branching tubes. These are the unmistakable elements of a fungus, and they differ from those found in favus, already described, in the shape and size of the spores or conidia, and the much smaller quantity of the mycelium.

Eczema Marginatum.

There is occasionally observed upon the central portions of the trunk, especially about the inner surface of the thighs and lower abdomen a diseased condition of the skin of peculiar appearance, which Prof. Hebra was the first to particularly describe under the name eczema marginatum. It begins as a small round patch of papules and vesicles, which itches excessively and excites scratching. As it spreads it heals in the centre, sinking down and leaving a dark red, scaly condition of the skin, while the advancing border presents constantly an elevated ridge of papules, vesicles, and other lesions of eczema, upon an inflamed base. The scratching aggravates the severity of the symptoms and tissue-changes, and gives a markedly eczematous appearance to the part. The affection differs from eczema, however, in the central retrogression and the concentration of its activity at the advancing edges. It may extend thus over large and continuous portions of the trunk and limbs, but the appearances never vary from the type of the raised and narrow margin of papules, vesicles, excoriations and crusts, and the dark red and scaly state of the parts earlier affected. New centres of the disease may be developed simultaneously on neighboring parts, and occasionally the same process is repeated within the borders of the old patch; the whole then exhibiting concentric rings of the character already described upon a general field of a dark red color.

This affection has been the subject of much discussion within the last few years. As early as 1864 Köbner of Breslau in his Mittheilungen demonstrated its parasitic nature and the identity of the fungus found in it with that of ringworm of other parts of the body, and maintained that the two diseases were the same. His statements were not received, however, with all the consideration they deserved, and it was not until Dr. Pick of Prag, three years ago, again opened the question with still more positive proofs of the correctness of Köbner's views, that they were generally adopted by dermatologists. But why is it, it may be asked, if eczema marginatum is identical with ringworm, a very common affection, that there has ever been this doubt as to its nature and this reluctance still on the part of Prof. Hebra to regard the fungus found in it as the essential agent in its production, although obliged at last to admit its existence there? How does it differ from ordinary ringworm of the skin? Only in the more eczematous character of the lesions which compose the outer and active rim, and the greater amount of congestion and pigmentation which remain behind enclosed within it. The parasite in ordinary ringworm creates a cer-

tain amount of irritation of the skin, expressed by the formation mainly of papules, vesicles, and scales. In eczema marginatum the inflammatory process is aggravated, as shown by the addition to the lesions just mentioned of pustules and crusts, and greater exudation beneath where the source of the irritation is most actively at work, namely, at the edge. The deeper color within indicates only a higher grade of chronic inflammation. How therefore can we account for this difference in the degree of inflammation, the exciting cause being the same in both affections? It is evident that it must be due either to peculiarity in position or in the temperament or tendencies of the persons affected. The former, no doubt, is the reason why ringworm of the parts specified should assume the peculiarities described as eczema marginatum, for they are specially liable to a form of eczematous inflammation, and its chronic character will explain why a true eczema of the same parts might at times be converted into this form of disease. No doubt, however, that both position and individual tendencies operate in its production, for we may have ordinary ringworm of the same parts presenting none of the peculiarities of the eczema marginatum form, and on the other hand true eczema may affect them indefinitely as such without becoming accidentally inoculated with the fungus of, and converted into, ringworm. Eczema marginatum, then, is to be regarded either as ringworm of certain parts exciting an eczematous inflammation in addition to the lesions ordinarily produced by itself, or as ordinary eczema modified by the subsequent development upon it of the parasitic elements of ringworm.

Of the real nature of the affection, however started, there can be no doubt. Removing some of the epidermal cells from the border we shall find by the microscope precisely the same fungoid elements that we found in the scales of ringworm, conidia, mycelium, and micrococcus, although after the disease has existed for a long time they are often difficult of detection. Were this not sufficiently conclusive both as to its parasitic nature, and its identity with ringworm, we have in addition the experiments of Köbner and Pick, both of whom succeeded in producing unmistakable ringworm upon their own skins by transplanting some of the scales from cases of eczema marginatum, and the observation of many that ordinary ringworm has been seen to become converted into eczema marginatum after existing some time.

This disease is not of very frequent occurrence. It has been observed by Hebra to affect especially shoemakers and horse-soldiers, occupations most likely to add an eczematous character to a ringworm existing upon the thighs, or to generate a local eczema

of the parts for the later engrafting of parasitic elements. The disease occurs also upon other parts than those already mentioned; in and about the axillæ, for example, and upon the female breast. In India it is of not unfrequent occurrence, and is there called Burmese ringworm. The subjective symptoms are an exaggeration only of those above attributed to ringworm of other parts.

Ringworm of the Scalp.

The third variety of ringworm to be described is that seated upon the scalp, and, owing to the presence there of the hairs, its appearance and course differ greatly from those belonging to the forms affecting the non-hairy portions of the skin already mentioned. It is called Herpes tonsurans or Herpes tondens by the various writers on skin diseases, just as ringworm of the skin is called Herpes tonsurans or H. circinatus, although in no way allied to true Herpes. It would be better to adopt the title Tinea tondens or tonsurans, to correspond to Tinea favosa, the most acceptable title for favus. The terms *tonsurans* and *tondens* suggest the most striking feature of ringworm of the scalp, as the disease first manifests itself by the falling of the hair in circular spots, although not close to the skin as if shaven, as in alopecia areata, an affection to be described below, but by breaking off one or two lines from the surface and leaving the irregular stumps to project. The surface of these circumscribed patches is harsh, owing to the projection of the hair follicles as well as of the stumps, and from the thick coating of dry and diseased epidermal cells and the parasitic elements present. This, however, is not the first stage of the disease, although that which first attracts notice. It is preceded generally by the same appearance of circles of erythema, spreading outwards and healing at the centre as in ringworm of the skin, but without as markedly elevated a rim as in the latter. These, being concealed by the hairs, generally escape observation, and it is only by watching the development of new points of inoculation, as the disease progresses, that its early stages may be generally studied. After gaining a hold upon the epidermal cells, as shown by these manifestations, with which we are already familiar, the fungus soon affects the hairs; they become dry, lustreless and brittle, and break very easily, leaving the stumps projecting from the prominent follicles, as already described. As the disease spreads outwards from its central starting point, large, bare spots are formed, several inches in diameter, which may coalesce and thus give rise to a very large and continuous patch; or many separate points scattered over the scalp may give a spotted appearance to the

whole head. Thus the outlines of the affection are constantly changing in every case, but the minute and surface appearances of every spot are always the same, viz.: the stumps of hair, the white scaly matter, and the prominent follicles resembling shagreen, or the skin of a plucked fowl, as variously described by writers.

If the patches increase in size sufficiently to run down upon the neck or forehead, where there are no large hairs, the appearances change abruptly to those of ringworm of the skin; and on the other hand should, in a case of the latter, the affection sweep from the face on to the scalp, there are at once developed the characteristic features we are describing. It is by no means uncommon to observe both forms of the affection upon the same child; that is, the tonsurans upon the scalp and the circinatus upon the face forming continuous parts of one large ring, or to find in one child of a family the scalp affected, and upon the skin of another child or of the parent well-marked circles of ringworm.

Occasionally, however, other appearances are observed, which must be referred to individual temperament. When the irritation produced by the parasite, generally of slight character, is excessive, vesicles and pustules of considerable size may arise upon the affected parts, which terminate in thick crusts; or in other cases large nodules or tumors may be developed from the inflammation of the hair follicles, sub-epidermal abscesses, which open by several mouths and for a long time discharge a glutinous matter; a condition similar to that observed at times when the beard is affected, as will be seen below. Such cases may give rise to partial and permanent baldness, but fortunately they are rare.

Left to itself ringworm of the scalp, like favus, tends to perpetuate itself indefinitely. The hairs repeatedly fall and are reproduced, until the soil contains no more nutriment for the plant, or the follicles are obliterated by inflammation, in both of which conditions a local spontaneous cure of the disease results. It will sometimes apparently disappear more or less entirely, but almost always acquires new life, and thus may go on for years unless arrested by treatment.

If we pull out one of the hairs changed as described, and examine it by the microscope, we shall find the bulb much changed in appearance, flattened and distorted or, perhaps, wholly destroyed; the shaft, or all that remains of it, irregular in outline, and its free end splintered and jagged, like the uncut portion of the stump of a tree. The various structures of the hair are scarcely distinguishable, and the longitudinal fibres are distended and forced apart by the parasitic growth. This is seen to consist of an innu-

merable number of spores or conidia, covering the outside of the hair, and penetrating its tissues throughout its length. But little of the myceloid growth is seen. The epidermal cells surrounding it, and those which make the scaly matter covering the general surface of the bald patch, are likewise filled with the same elements. These are identical in appearance with those already described as discovered in the other varieties of the disease.

Ringworm of the scalp is a frequent affection among children, and often occurs upon the same individual and at the same time with ringworm of the general surface. The one may readily give rise to the other upon another person. In adults, however, it very rarely affects the scalp, and it may exist for months upon the hairy portions of the face, and extend from these parts over large portions of the body without appearing upon the head. Indeed, I have never seen but one adult thus affected, while the beard in gentlemen, as will be explained in another connection, is very frequently the seat of ordinary ringworm. Unlike favus, it is of more frequent occurrence in cities than in the country. It is in orphan asylums that it is most commonly found, and the introduction of a child affected with it is often the cause of an outbreak which may spread among scores of the inmates and last for months, before it can be exterminated. It causes some degree of itching, and, as just stated, occasionally a circumscribed inflammation sufficient to destroy the hair follicles, and thus produce partial baldness, but it does not affect the health in any way.

Ringworm of the Beard.—Sycosis.—Barber's Itch.

Ringworm of the beard presents very unlike appearances at different times, so dissimilar in fact as to pass generally for entirely distinct diseases. As just stated, it is in one form a very common affection among young men, and its real nature is then readily recognized even by the patient. The latter appearances are those of ordinary ringworm of the chin and those of the scalp affection just described, more or less combined, and are called simply ringworm. They may be designated as the

First Stage.—It begins, as upon the non-hairy portions of the face or body, in the form of small points, which generally attain the size of a pea or a cent, before they attract much attention. They spread rapidly in a circular form, flattening down in the centre as the elevated margin of papules or vesicles enlarges, and are accompanied by a considerable degree of itching and burning. The centres of the patches remain more or less reddened and scaly, but seldom present the white, branny look, so characteristic of their

seat upon the scalp; probably because the parts are so much more frequently washed. The sides of the face are its most common starting-point, from which the rings may spread in every direction, or new ones may be started from these upon other parts by self-inoculation; the itching causing frequent rubbing with the hands, and in this way transference of the parasitic elements elsewhere. When the circle spreads beyond the beard, the appearances of such portions of the patch are identical with those of ringworm originally started upon the general surface of the skin. The disease may thus run on for some time in the beard without any apparent change in the hairs, but sooner or later, the period varying greatly in different cases, the hairs begin to fall from the parts affected, thus defining the patches more conspicuously than before. The hairs break off a short distance above the surface, and leave ragged stumps, as on the scalp. Ringworm of the beard primarily occurs generally upon those parts of the face which are shaven, or in other words upon those persons who are shaved; much less frequently upon others, for reasons to be hereafter given. On this account it seldom exists long without attracting attention, and its effects and changing phases may be carefully studied. It may extend from the shaven portion of the face into parts of the beard worn long, or, beginning in the form of herpes circinatus upon the neck, spread upwards into the long hairs of the face, but it seldom primarily gets a seat in a full beard. The fashions of wearing the beard, or the methods of shaving practised by the barbers in different countries, may have much to do with the comparative frequency of occurrence of this stage of ringworm of the hairy portions of the face among various nations, certainly a great difference in this respect exists; German writers, including Prof. Hebra, saying that simple tinea tonsurans of the beard seldom if ever occurs in their large cities. In France, on the other hand, it is spoken of as more prevalent. Here at any rate it is of very common occurrence, as will be shown in connection with the subject of the causes of the parasitic affections of the skin. It often apparently disappears, to revive again and again, and thus may run on indefinitely even for years, when left to itself, or when unsuccessfully treated. Occasionally, however, other appearances are added to the typical symptoms of the affection above given. After existing thus for months, possibly for a year or more, the beginning of those lesions of the skin becomes manifest, which characterize the second stage of the disease. Simple ringworm of the beard becomes in other words,

Sycosis. Second Stage.—This is an affection about which there has been even more difference of opinion expressed among derma-

tologists than in the case of eczema marginatum and its relations to ringworm. This has arisen from the circumstance that there are two affections of the beard closely resembling each other in appearance, but due to different causes, which are confounded with each other, and which bear no distinguishing titles. Sycosis may be defined in general terms as a chronic inflammation of the hair follicles of the face. It begins in the form of a small nodule about the insertion of the hair, which slowly enlarges and, if the inflammation runs high enough, discharges pus from its summit, which dries and forms a crust about the hair. This process is repeated in the individual follicles several times generally, the nodules varying in size and prominence according to the degree of inflammation. In later stages the nodules and pustules may be converted into hard and large, prominent tubercles, giving rise to thicker crusts upon their surfaces as they suppurate, or forming large, raw indurations. The tissues beneath the skin may in time become involved and large abscesses be formed. Thus the disease may go on for months or years, spreading gradually over the hairy portions of the face, and affecting sometimes the eyelashes and eyebrows. When the inflammation is excessive, the hair follicles thus affected are destroyed and permanent baldness results. Great disfigurement and local distress are often caused by it. It forms one of those chronic affections of the beard known as barber's itch.

Now it is about the *cause* of this affection that the difference of opinion above mentioned has arisen. Gruby was the first to suggest its cryptogamic character, and called the parasitic elements found microsporon mentagrophytes, mentagra being another name for the disease. Hebra and other distinguished German observers failed to discover the presence of a parasite except in very rare instances, and therefore consider its occurrence purely accidental, and in no way connected with its production. They regard the disease, therefore, as simple acne of the beard. The French observers, on the other hand, insist upon its parasitic character, but regard the fungus found as the trichophyton tonsurans, the same as that common to all the varieties of ringworm we have described, or in other words that sycosis is merely Herpes tonsurans of the beard, its final stage. There can be no doubt of the accuracy of this latter view in part, nor are the opinions of Hebra and others wholly wrong. There is a parasitic form of sycosis, there is a non-parasitic form of sycosis. Köbner, who has done so much to clear up the doubts concerning this class of affections and this disease in particular, calls the former Folliculitis barbæ, the latter Sycosis parasitaria, and his investigations show that the latter form is by no means so

uncommon in Germany as the statements of other observers teach, although there can be no doubt that it is much more prevalent in Paris and Boston than in Vienna; a fact, taken in connection with the more frequent occurrence in the two former places of simple ringworm of the beard, of important bearing upon its relations to the latter. Köbner bases his opinion, that parasitic sycosis is only the worst and most advanced stage of Herpes tonsurans, upon the following observations, stated in brief: 1st, the fungus found in both is identical in form, size and distribution; 2d, the transfer of the crusts of sycosis to the skin of the same or of another individual produces Herpes circinatus and on the other hand, of material from this, or from the head in ringworm of the scalp, to the beard of another person causes sycosis; and 3d, parasitic sycosis generally begins with ringworm of the beard.

The latest study of the disease has been made by Prof. Tanturri, whose observations may be found at length in the Italian and German journals of dermatology. His conclusions are stated in abstract in the latter as follows: 1. Herpes tonsurans generally precedes the development of phytosycosis. 2. Phytosycosis is not an accidental symptom, but the direct consequence of Herpes tonsurans. 3. Phytosycosis is still contagious, even when Herpes tonsurans no longer exists. 4. The parasite of phytosycosis is found in the hair which penetrates the nodules and pustules, and also around it; and, 5, is identical with that of Herpes tonsurans. 6. Phytosycosis is distinguished from the idiopathic sycosis by its morphological, clinical and anatomical characters. These important points of distinction cannot be given here in detail, but may be found in the journals referred to, and are also minutely discussed by Köbner in his valuable work. It must be said, however, that in many cases the mere appearances at some periods would be insufficient to distinguish the parasitic from the non-parasitic inflamation of the hair-follicles, and that the clinical history and, most important of all, the microscopic examination, are aids in diagnosis never to be discarded, sometimes indispensable. That parasitic sycosis is the latest stage of ringworm in the beard, I have no doubt remaining, for I have watched the conversion of the one into the other in several cases.

Ringworm of the Nail.

The last form remaining to be described is ringworm of the nails. Occasionally some one or more of the nails of persons affected with any of the varieties above described, or of those having the daily and long-continued care of such patients, lose their transparency, become opaque and dry, and gradually thicken. Their surface ap-

pears rough, and cracks easily, and their free edge is blunted. Their substance is brittle, and flakes off superficially in the form of scales. If these be examined by the microscope, the flattened cells of which they are composed will be found filled with a parasitic growth, consisting of long chains of conidia, more or less branched, of a few slender myceloid tubes without septa, and of small round cells or spores. Such a condition continues for years or perpetually, unless the plant is destroyed by treatment. Such cases form one of the varieties of so-called onychomykosis, a name applied to all the parasitic affections of the nails, of which, also, the favus form, already described, is another. Whether there be in fact other varieties than these two, dependent upon the growth of other fungi than those found in Tinea tonsurans and T. favosa, is a matter much discussed, but not easy of solution, because the growth of the plant in nail substance is very unlike its modes of development in the other cutaneous structures; so much so, that without the clinical history, it is often impossible to say to which of these varieties any case shall be referred.

PITYRIASIS VERSICOLOR.

The other remaining parasitic affection of the human skin, concerning the cryptogamic nature of which no doubt exists, bears the above name. It is also called by some writers Tinea versicolor. It is characterized by the formation upon the surface of yellowish or buff-brown spots of irregular outline, but slightly elevated, and covered with fine scales, which are easily scratched up by the nails, or removed by scraping with a knife. They vary in size from minute points to confluent patches of sufficient extent to cover large portions of the chest or abdomen. They chiefly affect the front trunk, beginning generally upon the chest, and may extend downward so as to cover more or less wholly the abdomen, hips, and upper thighs, and upwards to the shoulders, and thence down to the forearms, or creep around the chest to the back. They rarely appear below the knees and elbows, or ascend upwards upon the neck, and never affect the face. In other words, they do not generally grow upon those parts of the skin which are exposed to the air and light, finding rather upon those parts protected by clothing the warmth, and possibly the absence of light, essential to the development of the plant. It seldom, if ever, occurs upon children, which may be explained, perhaps, by the choice the parasite shows for the dry and outer cells of the epidermis, those of adult life being probably better adapted in this respect to its needs. It is said, also, to occur less frequently upon women than upon men; but it

is not unfrequently communicated from husband to wife, and flourishes as vigorously upon the female skin, when once started, as upon the male. When once established, it seldom disappears spontaneously, but may go on for years, perhaps dying out largely during the winter, to revive and extend over wider areas during the summer. It often gives rise to great itching of the parts affected, although in some cases the patient is not conscious of its presence through any sensations it may cause. It is often mistaken for, and confounded with, the pigment stains upon the skin called moth, liver-spots, or chloasma, an affection differing from it in position, anatomical seat, course, and clinical history.

An examination by the microscope of a few of the scales, so easily removed, from a patch of pityriasis versicolor, will readily establish its nature. We see lying between the upper layers of epidemal cells countless numbers of round conidia or spores, grouped in clusters, of high refractive power, and resembling minute oil globules. Associated with these are fine tubes of mycelium running in a net-work of endless intricacy. About the opening of a hair follicle the parasite may be seen reaching down the canal, and possibly it may run over the surface of the hair; but it never penetrates it deeply or alters its structure. This plant has been generally called microsporon furfur. Its relations to the other parasitic fungi will be spoken of in another place.

The disease is of not unfrequent occurrence here, although its presence is frequently overlooked by its host, and is only discovered by the physician when examining the naked chest for other reasons. It is on this account that it has been said to affect consumptive patients especially. There is no other ground, however, for such an opinion. Its growth is entirely independent of, and unconnected with, the general condition of the person it affects, nor does it exert any injurious influence upon the same, save the itching it occasions. It is positively contagious,—husbands giving it to their wives, as above stated, and as also proved by direct experiment. The spread of the disease from one portion of the body to another is likewise affected by the transplanting of the spores in the furrows ploughed up in the healthy epidermis by the nails while scratching. Still it is not by any means so easily communicated to new hosts as the tricophyton tonsurans, nor is it so easy to trace the source of contagion in any particular case. The color it imparts to the skin is a property of the fungus, as much as the yellowness of the favus crust belongs to the achorion.

Thus far in our subject there has been either no doubt as to the cryptogamic nature of the affections considered, or, if difference of opinion upon this point does exist with regard to some of them, the weight of evidence is such as to overrule such difference in the direction already stated. But we now have to refer to an affection, which is still one of undecided position, and concerning the nature of which dermatologists differ widely in opinion.

ALOPECIA AREATA.

Alopecia circumscripta. Area celsi. Porrigo decalvans. Tinea decalvans.

These are the names given by different writers to this singular affection, which is characterized by the existence of circular, bald spots, of a smooth and shaven appearance upon the scalp, apparently whiter than the surrounding skin. Before it is discovered the disease has generally attained considerable headway, and one or several bald spots, the size of a dime or larger, first attract the attention of the patient or of other members of the family. These increase more or less rapidly and may coalesce, forming large bald patches many inches in diameter, or even in time spread over the whole scalp. The eyelashes may be lost in the same way, and in rare cases all the hairs upon the body are destroyed. The baldness thus produced is not always permanent, and the hair may be reproduced spontaneously even in part, but generally the new growth becomes affected in the same way and falls again. If we examine the surface of one of the patches in its early stage, we shall find no vestige of the hair upon it, and its limits sharply defined by apparently sound hairs. Sometimes the scalp feels thickened or œdematous over the bald spot and somewhat beyond and around it, and occasionally with this is associated a slight erythematous blush. In later stages there is often a partial restoration of the activity of the hair follicles, and in place of the normal growth of the part, lanugo, or short and colorless, downy hairs are produced. When the disease has existed for a long time, years it may be, these in turn may disappear, and the scalp may present over its whole surface that bald and shining, alabaster whiteness and smoothness, so characteristic of senile atrophy of the skin, divided off into separate districts, perhaps, by spare lines and tufts of hairs untouched by the disease.

What is the cause of this strange affection? In 1842, Gruby discovered in the hairs of a case a fungus which he called microsporon audouini; and as the clinical history of the affection favored this view, and as the plant was seen and figured by other competent observers, it was generally accepted by dermatologists that it was of a parasitic nature. Inasmuch, however, as observation since then, and especially of late, has failed to detect the presence of the fungus in all or in a large proportion of the cases examined microscopically, doubts have arisen as to its parasitic nature, and the recent German writers deny it altogether. They base their opinions upon their failure to find in cases recently examined any such plant as Gruby described, or as Bazin and other dermatologists have figured; but inasmuch as their testimony is wholly of a negative character, how is it that they offer it as an offset to the positive observations of other and equally competent investigators? They attempt to sustain the validity of their position by denying the competency of those who hold the opposite opinion. They say that in the case where the supposed fungus has been seen, either fat globules have been mistaken for spores, or, if the appearances seen were really due to the presence of parasitic elements, the case must have been one of ringworm. In other words, that the authorities in question were not sufficiently good microscopists to distinguish the cells of a fungus from sebaceous matter, or sufficiently careful clinical observers to know tinea tonsurans from alopecia areata. Now when this style of argument is applied to such men as Bazin and Fox on the one hand, who have seen and figured the plant, and to Hardy, McCall Anderson and many others, who believe in its parasitic and contagious nature, its absurdity becomes apparent.*

* Is it to be supposed that one who gives such precautions as the following would himself fall into the errors he is warning against? "The greatest care must be taken on every occasion to distinguish between fatty cells and spores. * * * * If we suspect the presence of much fat, it is advisable to allow the hair or other object *to soak for some time* in ether if any doubt exists as to the nature of any particles, cells or granules. The fat cells always exhibit a wide variation as regards size, and have a duller aspect; the cells of the fungus, on the other hand, are uniform in size in any particular case, refract the light very perfectly, and their outline is more defined and contoured; they are not affected by ether. In old standing cases of tinea, the epithelial cells take on a kind of fatty degeneration, and look very like cells invaded by sporules. When the *mycelium* is well developed no mistake can well arise, but there are one or two foreign matters and modifications of normal structure that offer appearances similar in aspect to some of the less flourishing examples of mycelial threads. I have known the fibres from handkerchiefs or

If we pull out the hairs bordering upon the bald patch in the early stages, we shall find scarcely any root present, the ends tapering to a slender point from atrophy. The spores or conidia, which occur both in the substance of the hairs and on their exterior, vary considerably in size, and the scanty myceloid growth which accompanies them is very small. According to Fox the hairs contain also a large quantity of the minute stromal form of the plant which generally escapes detection, and from which the distinct sporular form may be artificially developed.

To the list of those who have been fortunate enough to see the fungus in cases of Alopecia areata, I may add myself. In two young gentlemen, aged seventeen and twenty-four, companions, and presenting all the striking and unmistakable characteristics of the disease, all the parasitic elements were found to be abundantly present. The relationship existing between them, points to the support afforded to the questioned parasitic nature of the affection by its clinical history in general, as above stated. It is as fair to suppose the one case to have been taken from the other, as if they had both been cases of ordinary ringworm. The evidence in favor of its contagiousness as furnished by many dermatologists, is conclusive, although it is by no means eminently so. Compared with the other parasitic affections in this respect, it should be ranked as follows in a descending scale: Tinea tonsurans, T. favosa, T. versicolor, T. decalvans.

If then we accept as established the parasitic nature of the disease, how shall we on the other hand account for the opposite view held by German and other authorities, who fail to discover grounds for such belief, and at the same time not be open to the charge of tacitly accusing them also of incompe-

towels which have been used to cleanse the object-glass to be recognized as mycelial filaments. Sometimes some of the fibres of the hair will be stripped off the shaft and curl back like mycelium. The safeguard is to get the mycelium free from surroundings, and then no error can arise. The imbrication of the epithelium is sometimes irregular, and the edges of the scales present exactly the appearance of mycelium running transversely through and across the shaft of the hair, and it is really difficult to imagine that filaments are not present, more especially if there happen to be a few sporules scattered throughout the interior of the hair." This extract is from Dr. Tilbury Fox's recent work on Skin Diseases, and it is given here at length to show the errors to be avoided in the study of the parasitic affections, and that he at least may not be considered capable of the mistakes in question.

tency? Were there no other solution of such entire discrepancy in the views of equally competent observers, than which were most likely to be right or least likely to be wrong, it would still be easy to decide upon which side of the question to range ourselves, for in such cases the negative evidence of twenty good observers cannot be set against the weight of one good positive observation. But it is not necessary to resort to such an invidious method of solution. The evidence of both parties may be received with credence, and is consistent, when properly interpreted. There is a parasitic and a non-parasitic form of alopecia areata, just as there is a parasitic and a non-parasitic sycosis. In other words, the hair may fall in circumscribed patches from the growth of a parasite in its tissues, and it may fall apparently in the same way from atrophy of the bulb due to other causes There may be hereafter material difference observed in the clinical history of the two forms, possibly in their gross appearances also, so that they may be distinguished the one from the other, without the aid of the microscope; but at present this is impossible. When we recall the history of sycosis and of eczema marginatum, we need not fear that authority, however eminent, can prevent the elucidation of truth by any amount of dogmatic assertion. Such matters are to be settled by the quiet researches of a Köbner, not by international controversies. Positive and reliable evidence has demonstrated the existence of a parasitic alopecia. Negative evidence on the other hand has as fully shown that a large proportion of the cases so called are not of the parasitic form. It may be that the former is much more common in England and France than in Germany, just as parasitic sycosis is more prevalent in the former countries, and this may help explain the discrepancy in the views of the authorities in different parts of Europe. Amongst ourselves, the parasitic form is, according to my own observations, rare, whereas cases of the disease collectively, are not very uncommon. That there are very marked differences in the course and appearances of the various cases that occur here, there can be no question; their ætiological significance remains to be determined by future observation.

rence of other fungi in the ear, it may be said in this connection that Wreden has never detected the latter in the ear, nor has he been able to produce it from the former by cultivation, although Karsten and others believe in their botanical identity. Other forms of fungus growth have been occasionally found associated with aspergillus in the ear, but their presence is generally looked upon as an accidental occurrence.

3. *Pseudo-Parasites.*

As already stated various affections of the skin and its appendages have at times been considered to be of a parasitic nature, which closer observation has shown to be erroneous, while in certain of them fungi have been from time to time discovered, their presence at such times being only accidental. Among the instances of parasitic growth more intimately connected with our subject than such, is the so-called *Chignon-fungus.* Some degree of alarm was not long ago created among ladies by stories of the occurrence of various sorts of parasitic growths upon the false hair so generally worn by them, and the writer has seen not a few cases of disease of the scalp supposed by the patients to have been "caught" from some impurity attached to the chignon worn. Such fears are groundless. There have been often observed little globular masses upon the shafts of the hairs before cleansing, and, in cases where such cleansing is not properly done, also upon the hairs after being manufactured into shapes for wear. These masses are composed of the elements of a fungus, which has received the name *Pleurococcus Beigeli;* Dr. Beigel being among the first to investigate their nature. Hallier considers it a sclerotium, another stage of penicillium, but this opinion, like many of those advanced by him, needs confirmation. There is no reason to suppose it capable of attaching itself to living tissue or of creating any disease of the parts with which it might be brought in contact.

The possibility of receiving animal parasites through the false hair worn, is a question of course foreign to our subject; but it may be added in this connection that the dried sebaceous concretions, which form at times upon the shafts of the hair, and are popularly called hair-eaters, and supposed to be a cause of loss of hair, are not to be confounded with anything of a parasitic nature.

4. *Parasitic Plants upon Animals.*

Favus.

But it is not upon man alone that the forms we have been considering grow; they are found likewise upon domestic animals, and may be communicated from the latter to persons brought in contact with them. I have before me, while I write, the body of a young mouse, one of a family of several caught in a seed store in this city, all of which presented similar appearances. Its head resembles a kernel of popped corn more than anything else, its form and features being concealed by an exuberant growth of dry, yellow matter. Examined by the microscope this is seen to be composed of fungus elements identical with those of the achorion schoenleinii found in favus of the human subject. Upon the mouse, too, well marked and characteristic favus-shaped crusts are to be detected. Such cases are occasionally met with. Cats catching mice marked in this way have exhibited well-formed favus crusts upon their paws, and have communicated the disease to their kittens. Dogs, too, that have caught mice similarly affected have had favus crusts developed upon their fore-paws. In the same way the disease may extend from any of these domestic animals to man, cases of which are cited in abundance. Both mice and cats have repeatedly communicated favus to children playing with them, and St. Cyr in some recent experiments received it himself from a dog, to which animal he had transferred it from a cat. Artificially it has been again and again cultivated upon rabbits with material from the human subject, and even upon the heads of hens it has been observed in two instances. Upon all these animals, either about the hairs or feathers, the unmistakable form of the favus crust was developed, preceded in the carefully watched cases of artificial inoculation by the herpetic or ringworm-like earlier manifestations, precisely as on the skin of man. The presence of favus, therefore, upon such animals may be easily recognized, and by proper precautions its farther transmission may be prevented. As it occurs upon mice more commonly than upon other animals, and upon such others mainly as come in contact with them, it is possible that they are to be regarded as the original or favorite host of this parasite, through which it has been introduced upon man.

Tinea tonsurans.

Ringworm, too, has been observed upon some of the domestic animals, presenting the same characteristic appearances, the circular patches with elevated and advancing borders, the scaly central portion, and the stumps of hair projecting from the parts long affected, as upon the skin of man; and in the epidermal scales and the hairs removed from them precisely the same parasitic elements are detected by the microscope as in the various forms of ringworm upon man. The animals most commonly affected in this way are the cow and the horse, and Gerlach has succeeded in transplanting it from oxen to calves and horses, and from these to his own arm and to the skin of his pupils. In these, and in similar cases of inoculation conducted by other observers, the transfer of parasitic matter from the animal to man has in every instance given rise to true ringworm. Upon the sheep and the pig the plant has not yet been made to grow. But artificial inoculation is by no means essential to the communication of the disease from the animal to the human subject. Numerous cases are on record of cow-keepers and milkmaids taking it from their four-footed charge, of children from calves, and of grooms and cavalry soldiers from their horses. I have myself seen three children with well-marked ringworm of the hands and face taken from the family cat, which was similarly affected. Upon these animals it constitutes one of several affections called mange.

Tinea versicolor.

With regard to this affection no instance of its natural occurrence upon animals, so far as I am aware, has been observed, although Köbner has succeeded in producing upon the rabbit by inoculation a well defined scaliness of the skin lasting from five to seven weeks, in which abundant conidia and slender fungoid threads were found.

5. *On the supposed identity of the Vegetable Parasites, and their relations to the Common Moulds.*

To those not familiar with the recent literature of this branch of dermatology it may seem surprising that very contradictory opinions prevail among authorities upon the subject with regard to the mutual relations of the vegetable parasites we have been

considering. As we have described the various affections to which they give rise, it will have been observed that they differ from each other in external appearance manifestly, and that the fungus elements belonging to each have their individuality marked with equal distinctness when examined by the microscope. How then could the question of the possible identity of all these forms have arisen, and have become one of the most interesting subjects for the investigation of dermatologists and mycologists of the present day? How can it be that such men as Hebra and Pick, Fox and Hutchinson, as examples, upon the one side, should believe that Favus, Ringworm, and Pityriasis versicolor are all forms of disease caused by one and the same fungus, exhibiting its variations in growth and external manifestations according to its stage of development, soil, etc., while on the other hand Bärensprung and Köbner, Anderson and all the French authorities, observers equally well known and trusted, should maintain as positive a belief in their non-identity? The same difference of opinion exists among the mycologists who have investigated the subject from their special point of view. It is evident, therefore, that no absolutely positive answer can be given to this important question in our present state of knowledge. The data upon which any probable conclusion in the matter can be based must be the result of three methods of investigation: first, clinical observation; second, artificial inoculation; third, study of the full development of the fungi in question by cultivation.

First. It was clinical observation which first led Hebra to believe in the identity of the parasites found in favus and ringworm. He noticed the occasional development of favus crusts in cases of ringworm, and the production of both, alone or in combination, upon parts to which poultices were applied. He concludes, therefore, that Tinea tonsurans is an earlier stage of Tinea favosa, while Tinea versicolor is a still younger phase of development of the same plant.

With regard to the latter affection, it may as well be removed from our consideration of the question at once. No good clinical ground (the opinions of Hebra and Hutchinson to the contrary, notwithstanding), and certainly no sufficient experimental data, have ever been presented to show its connection with either favus or ringworm. Clinically, Tinea versicolor

must be considered a distinct affection, as heretofore by most dermatologists. Its mycological relations are yet to be discovered.

The question turns, therefore, mainly upon the relationship of the two other affections. Fox believes that favus can be directly produced from bad cases of ringworm by keeping up a proper amount of irritation. There can be no doubt of the occurrence at times of favus in cases of ringworm, also none of the occasional development of both affections (in Germany, at least,) upon portions of the skin covered with damp cloths or poultices. Such occurrences are rare, however, and by themselves are of little weight in the question of identity, when we consider that in one hundred cases of chronic ringworm favus may not be developed a single time, and that favus may, and generally does, exist for years without any association with any of the varieties of true ringworm. The exceptional cases of the development of favus upon the latter may well be wholly coincidences, and should be fairly so considered when balanced against the clinical proofs of the non-identity of the two. In connection with the other class of cases, in which herpes tonsurans is said to be more or less frequently observed accompanying favus, it must be remembered, as already stated, that the early stage of the latter very closely resembles ringworm, and has been called by Köbner, who has made the subject a special matter of investigation, the early herpetic stage (das herpetisches Vorsta dium). That such appearances are often mistaken for ringworm, and have largely contributed to the belief in the frequent association or identity of the two affections, there can be little doubt. Peyritsch, in the most recent investigations upon the inoculation of favus, and St. Cyr, in his late experiments upon the transmissibility of the affection to animals, and from them to man, both speak of the occurrence of this ringworm-like stage of favus, and of its liability to be confounded with Tinea tonsurans. The latter says that both Rollet and Tripier recognized, in the appearances upon his own arm, produced by inoculation from his dogs affected with favus, appearances which offered "*tous les caractères d'un bel' herpès circiné*," "*non un herpès circiné legitime, mais bien une forme de la teigne faveuse véritable.*"

Peyritsch concludes, as the result of his experiments, that

"herpetic eruptions often occur as a vorstadium after inoculation with favus, but also not infrequently after the development of the cup-shaped crusts, and often not at all; that these appearances are the result of irritation, and are not identical with Herpes tonsurans circinatus." Köbner recognizes and describes in the external appearances characteristic differences by which the true ringworm and the herpetic stage of favus may be distinguished from each other, which need not be given here in detail, but another means of differential diagnosis is afforded by the microscope, by which the fungus elements present in the latter are shown to be those belonging to favus, the achorion and not trycophyton. Now, without attaching much significance to minute differences in the microscopic appearances of parasitic fungi, so far as this bears upon their botanical identity, for clinical purposes they are of some degree of importance, and when these differences are constant and consistent only with the theory of the non-identity of these affections, their significance must not be disregarded. When, therefore, a case occurs in which favus and herpes tonsurans appear to be combined, and in which fungus elements apparently identical with those of the latter are found in the outlying circles, as in the case reported by Kohn in the 3d Heft of the Archiv für Dermatologie of the present year, we cannot regard it in any other light than exceptional, and as an instance of the chance, coincident occurrence of the two distinct diseases.

The clinical proofs of their non-identity, as shown by the history of thousands of cases of pure tinea tonsurans without any development of favus in connection with them; in the highly exceptional simultaneous or subsequent appearance of true ringworm in cases of favus; the frequency of the former, the rarity of the latter, in communities, and the varying relations of their comparative frequency both in different countries and in cities and rural districts; the prevalence of ringworm of the scalp for years continuously in orphan asylums without the production or transmission of any other parasitic affection than itself among the inmates; the ease with which the one, the difficulty with which the other, is communicated; the spontaneous transmissibility of both forms from man to the domestic animals and back again through several hosts to the human subject, their individual identity being without exception pre-

served the meanwhile,—these and other facts, which might be mentioned, would seem to be conclusive.

Second. The results of inoculation, as practised especially to determine this question, point almost without exception to the same conclusion. Favus, when transplanted from man to man, from man to domestic animals, or from animal to animal, produces always favus and nothing but favus, according to the experiments of Köbner, St. Cyr, and Peyritsch, above referred to, and the same unvarying preservation of individuality has been observed with tinea tonsurans. On the other hand, Pick believes that he has obtained indifferently both affections by inoculation of the parasitic elements of either one. His results, therefore, are directly at variance with those of former observers, and as they are of a positive character, while those of the others are merely negative, they might seem entitled to the greater weight in the question. When we consider, however, that all the other observers have obtained results seemingly pointing to the same conclusions, but which have been otherwise interpreted by them, we think that, in connection with the recognized fact of the herpetic stage of favus, Pick's views may be fairly set aside until they are confirmed by other investigations and by general clinical observation.

Third. Another method of studying the question, and one which would seem to promise an easy and positive settlement, is that by cultivation. That none of the parasitic fungi we have been considering attain their normal and perfect forms under the conditions of their growth upon the skin, and that therefore their true botanical position is to be learned by observation of them under circumstances better fitted for their complete development, is universally recognized. In accomplishing this, however, it is evident that we should also settle definitely this question of their mutual relations, for if the fungus of Tinea tonsurans and of T. favosa are in reality identical and so seemingly unlike in their microscopic appearances, external manifestations, and clinical history from differences in soil, in stage, or from any other of the various causes assigned to account for their apparent non-identity, it is evident that if removed from the skin to conditions favorable to their normal growth, we should have a return to their one common parent form, and thus have before us the long-sought solution of this

mysterious question. This method of study has therefore been eagerly adopted within the last few years, but the results obtained unfortunately are far more contradictory, and unsatisfactory even, than those derived from clinical observation and from inoculation. The difficulty has not been in making the fungi taken from these cutaneous diseases to grow apparently when transferred to other soils, but to convert them always into the same fungi, when they have attained their perfect development. Not only do different observers obtain different results, but various results at different times. Thus by transplanting favus elements to various substances, such as glycerin, albumen, milk-sugar, starch, paste, the surface of fresh fruits, etc., or to solutions of certain salts, matters upon which fungi are known to thrive, all sorts of moulds are obtained after a while, among which of most frequent occurrence are penicillium glaucum, mucor mucedo, aspergillus glaucus and torula.

Hoffman obtained in this way penicillium and mucor, but looks upon the former as an accidental occurrence, and upon the latter as the real cause of favus, while other mycologists regard both as botanically identical. Hallier states that he has seen the parasite in favus develop into penicillium; Baumgarten also obtained penicillium from its cultivation; and Lowe, aspergillus. Pick, too, has obtained from tinea favosa, penicillium. With regard to the fungus of herpes tonsurans in particular, Hallier at first looked upon the tricophyton as penicillium, but later makes it out to be aspergillus. Pick cultivates it into penicillium, while Neumann sees it developed into penicillium and trichothecium. The fungus of pityriasis versicolor, too, Hallier finds no difficulty in tracing back to its parent stock, making it out to be stemphylium, the achorion form of aspergillus. With regard to the ear fungus, both forms, the aspergillus flavescens and A. nigricans, have been seen by Wreden to return under cultivation to aspergillus glaucus, while Karsten, from his experiments, is inclined to the opinion that penicillium is the original source from which they spring.

On the other hand, Köbner, Peyritsch, Karsten and de Barry, in their recent investigations in the same field, while finding no difficulty in obtaining penicillium and the like in their cultivations of favus matter, regard its presence in their experiments as

merely accidental. The elements of penicillium, aspergillus, etc., are omnipresent, awaiting only the proper conditions of soil, temperature and moisture for development, so that unless their germs are primarily excluded by the most rigorous measures from the materials and atmosphere used in these experiments, their constant appearance under circumstances best adapted to their growth, is not surprising, though their absence would be. Now such exclusion has been found to be almost an impossibility in all the methods of experimental cultivation hitherto employed by different observers, but the greater the precautions used to keep them out, the less frequent their occurrence. Thus Peyritsch in his experiments with the favus plant, generally got penicillium or mucor, but when he used extraordinary care no farther fungus development was observed.

This, with the results of his other experiments, which have been, and remain to be mentioned, leads him to the conclusion that "the specific individuality of achorion schoenleinii must, in our present state of knowledge, be preserved." De Barry also concludes from his investigations that the plant in favus, as well as the other cutaneous fungi, are specific parasites. Köbner failed to produce any mature form from the favus plant. Karsten in his recent work (Chemismus der Pflanzenzelle), states his belief that the achorion from its resemblance to the milk fungus may be derived from some common fungus, but has been unable to obtain any advanced growth by which its connection with such could be established. Neumann, too, in his latest published observations (Zur Entwicklungsgeschichte des Achorion), withdraws his former statement, that he had traced the parentage of favus to penicillium, and as the result of more careful methods of cultivation, says that he has been unable to obtain the perfect development of the achorion, and that the data for determining its connection with any known fungus are still wanting.

Still another method of gaining light upon this supposed connection between some of these common moulds and the vegetable parasitic growths of the skin has been tried. It is evident that if favus, and ringworm, and pityriasis versicolor were really caused by the attachment to, and subsequent growth upon, the skin of some of the elements of penicillium,

aspergillus and the like, to which the fungi found in these affections are referred by some of the observers above mentioned, it might be possible to produce these diseases *de novo*, by transplanting such common moulds to the human skin, and thus settle the matter. Attempts of this kind have frequently been made, and the results are as apparently conflicting as the evidence derived from the methods already considered. While Hallier asserts that he has produced true favus by transplanting penicillium to the skin, and Pick thinks that he has seen it give rise to the herpetic stage of favus, Peyritsch, and Köbner, and many other investigators have repeatedly tried to produce some parasitic affection by transplanting this and many of the most common moulds to the skin, but always without success; although they have found no difficulty in producing the diseases we have been considering by the same methods of transferring parasitic matter directly from them to other subjects, as already described.

If we accept as reliable the statements of those of the above observers who claim to have been thus exceptionally successful in these experiments, it must be only after due consideration of the possible fallacies attending them. The necessary application, for considerable periods, of bandages to protect the parts experimented upon, for instance, is one of the conditions most apt of itself to favor the accidental development of the diseases in question. The irritation of the skin, provoked by the dressings or lesions made, or by the foreign matter placed in contact with it, might readily be mistaken for the early stages of ringworm or favus. There should be no mistake, however, in the results obtained. Let there be one trustworthy production of well-marked favus by the transference, with necessary precautions, of any of the common moulds to the skin, and we should then have a piece of evidence about the character of which there could be no question, which could be preserved indefinitely for inspection, and which would go far to settle the matter in dispute. As it stands, however, this method of investigation, taking the negative and the so-claimed positive results together at their worth, has furnished no unquestionable proof of a direct connection between the well-known moulds and any of the parasitic affections. Indeed,

every day chance is offering to the success of such experiment the most favorable opportunity in the omnipresence of seed and abundance of cutaneous soil, harrowed and fertilized by nail and dirt, if these conditions be thought essential to the development of the former. In addition, every possible variation in the chemical and physical nature of the skin is offered in its multifarious changes in disease. That these diseases are not of this every-day production, is sufficient to show that the right seed is not at hand for development. That no peculiarity in the nature of the soil is requisite, the ease with which ringworm is transferred from one skin to another, even in the healthiest state, is a sufficient demonstration.

With regard to the identity, then, of the fungi found in these affections, we must still maintain their specific individuality, because clinically they are distinct, notwithstanding the deceptive inferences drawn from accidental coincidences, and because neither the results of transplanting nor of artificial cultivation have been such as to counterbalance even the negative evidence drawn from the same sources. With regard to their identity with any of the common moulds, the evidence presented is still more questionable.

Too much can scarcely be said in condemnation of the way in which experiments have been conducted by certain so-called observers to determine the supposed relations of moulds, not only to these affections, but to all sorts of internal and constitutional diseases. One might suppose, from the conclusions drawn by them from such investigations, that the cause of all diseases had been already determined. The most charitable opinion to express concerning much of what has been done or written in this country and in Europe, at least of such part of it as has claimed most positive results and the easy solution of some of the most mysterious questions concerning the causation of disease, is to call it boy's play. Unscientific work and hasty conclusions of this sort serve only to throw discredit upon one of the most important fields of research open to the pathologist, and to turn aside the true student from labor in it. The whole study of mycology is as yet in its infancy, and a master-mind is needed to clear away the mist and error thrown around it by such dabblers. In its present state it is to be feared that it can do little to settle even the questions we have been considering,

with reference to the affections universally acknowledged to be of a parasitic origin.*

6. *Precautions against Vegetable Parasites.*

Regarding, then, the vegetable parasites of the skin as specifically distinct and without established relations to any of the well-known and common moulds, (as a due regard to their clinical characteristics compels us in the present chaotic state of mycological knowledge respecting the mutual relations of the latter), what positive knowledge have we of their distribution and occurrence, by which the danger of acquiring the diseases they occasion may be prevented? That the minute elements of fungi may be conveyed by the atmosphere, their universal presence, as shown by the microscope upon a glass slide left for any time "undusted," and their unfailing development when suitable soil is provided, are sufficient proof. In the experiments conducted so extensively of late in connection with the question of spontaneous generation, and in those of artificial cultivation above alluded to, it has been found almost impossible to exclude such germs from the substances employed in them; and in this lies the fallacy of most of the conclusions drawn from such investigations Pasteur found that the air admitted to substances previously freed from such germs gave rise to new growths of the same in accordance with the nature of the surroundings. Thus, of the flasks deprived of air and opened at the foot of the Jura, at a remote distance from human habitations, 12 out of 20 remained free from organisms subsequently; at a height of 850 metres, 15 out of 20 remained free; and at a height of 2,000 metres only 1 of 20 showed signs of their growth; while of 13 opened at the inn only 3 failed

* Those who are especially interested in the question of the relations of low organisms to disease, will find in the articles below mentioned criticisms upon the imperfect methods of investigation employed, and upon the hasty conclusions drawn therefrom, by some of the recent observers and writers in this field of inquiry.

1. Ueber die pathogenetische Bedeutung der kleinsten Organismen bei Infections-krankheiten. Von Dr. August E. Vogl.—*Archiv für Dermatol. und Syph.*, 1870, *p.* 393.

2. Les Vegetaux parasites et les nouvelles Recherches sur les Maladies virulentes et contagieuses. Par Lortet.—*Annales de Dermatol. et de Syph. Duxième Année, p.* 29.

3. A Review of Dr. Salesbury's Microscopic Examinations of Blood; and Vegetations found in Variola, Vaccina, and Typhoid Fever.—*Boston Medical and Surgical Journal*, 1868, *Oct.* 1.

4. Der gegenwärtige Standpunkt der Mycologie mit Rücksicht auf die Lehre von den Infections-krankheiten. Von Dr. Eduard Eidam. Berlin, 1871.

to exhibit their development. These and similar experiments, repeated under varying conditions of locality, although they shed no light upon the occurrence or distribution of the particular fungi we have been considering, so far as we know, do illustrate the universality of similar elements near the habitations of men, and the ease with which they must be conveyed from place to place. Knowing nothing, therefore, of the parasitic fungi beyond that phase of their existence upon the skin of man and the domestic animals we have been considering, we must fall back upon the clinical history of each of these affections for our knowledge of the proper safeguard against them.

Tinea favosa.

We have already seen that this disease is observed much more frequently in the country than in the city, and among poor children than upon those who are kept clean. How infrequent its occurrence is in comparison with other cutaneous diseases may be judged by the following data. In three successive years out of some 10,000 affections of the skin in the Vienna clinic, only thirty-six cases were noticed. These were of course representatives of disease among the poorer classes. How much less frequently it occurs among the higher classes and a cleaner race, may be seen by examining Mr. Wilson's "statistics of cutaneous disease among the wealthier classes" in England. In 10,000 consecutive cases it occurred but three times. My own experience in this vicinity shows similar results. In 1,000 consecutive tabulated cases of skin disease among private patients, but a single case was seen; whereas in the same number of cases among out-patients of the skin department of the Massachusetts General Hospital, representing a poorer class of persons, there were four cases of the disease. My own observation teaches me that favus affects perfectly healthy skins belonging to perfectly healthy bodies; that no predisposition or cutaneous idiosyncrasy is essential to its development; that a dirty or a wounded epidermis is favorable to the attachment of the achorion, but not absolutely requisite; that although by no means so contagious as some of the other parasitic affections, yet almost every case is connected with others in the same family or among the playmates of the patient first affected, in the course of its long history; that nearly every case may be

traced back to its source of infection; that direct contact therefore with parties affected, either human or animal, is generally the cause of the spread of favus; and that without such communication there is little danger of acquiring it.

The following cases will illustrate the contagious nature of the disease, and the long time which sometimes elapses between inoculation and the development of the characteristic appearances. A few years ago I saw a poor girl, fifteen years old, of a consumptive family, who had had the disease seven years. She had always kept her head well wrapped up, and washed the bandages herself. She subsequently died of consumption, without having pursued any proper course of treatment for the favus. Three years before I first saw her, her little cousin, eight years old, had put on her bonnet, while the disease was in a very active condition. About a month afterwards a little pimple was observed on the crown of her head, which disappeared for a week or two at a time after washing it, but always returned. It appeared white and scaly. One year after the death of her cousin, the child was brought to me with a well-marked and large mass of favus situated upon this spot.

* * * Some time since I was called to see two strong and healthy children at the western end of the city, upon whose heads were well developed masses of favus. There were two other children in the family, and on examination the disease was found also upon one of these. It had appeared successively in all these cases. On going into the street I discovered a boy, a playmate of these children, with his head almost completely deprived of hair by a favus of long standing. From him the former had taken it.

Tinea tonsurans.

This, as already stated, is a much more contagious and therefore a much more common affection than favus, and is relatively of more frequent occurrence in cities than in the country. The greater ease with which it may be transferred from one host to another is best seen in large asylums. A case of favus may be admitted, and months may pass without transference to another child with ordinary care, and when entirely uncared for but few other cases will appear; whereas, if a single child with ringworm be admitted, the disease will spread rapidly among

the inmates, even before the original case may be detected. The same eminent contagiousness marks the spread of the affection in the community at large, and no age, no condition, no amount of cleanliness will prevent infection. In Mr. Wilson's statistics of 10,000 cases of cutaneous disease among the wealthy, 252 cases are noted, although in this number are not included cases of sycosis and eczema marginatum, which are varieties of the disease. Among the 1,000 cases of the same class in my own practice above quoted, eighty-one instances of all kinds are recorded, whereas in the other thousand from the out-patients of the Massachusetts General Hospital, only thirty-seven cases of all varieties occurred. It will be seen by these figures, first, how much more widely prevalent is herpes tonsurans than favus amongst all classes; and second, how much more frequent in comparison with the latter is its occurrence among the wealthy and cleanly than among the poorer classes.

I have several times been able to trace the transmission of the affection through the different members of several families in succession, all of whom were accustomed to the daily use of the bath, and the descendants of what was possibly a single spore at the time of its transference to the first case, may thus be kept in view for months and years, oftentimes upon successive hosts. The boy may bring home from school a ringworm of the face or hands, which may give rise to other ringworms upon any one or many members of the family, young and old, and from these may arise upon the former herpes tonsurans of the scalp, upon the latter sycosis or eczema marginatum. One of the most common starting-points of such occurrences in our community, however, is the *barber's shop*. A large proportion of the cases above enumerated, and many more might be added, since recorded, were of such origin. The patients were young gentlemen, and the barber's shops frequented by them were the best in Boston. From this it follows that the habits of the former in point of cleanliness were unquestionable, and the customs of the "establishments" such as are least likely to foster and communicate contagion. The danger of catching barber's itch, so called, or other horror usually associated with public shaving, is so universally and strongly prevalent among gentlemen, that extra precautions against such infection are generally taken by them. Such was the case in

most of the instances here referred to. The patients had nearly all had their own mug, soap, brushes and razors, yet with all these trusted safeguards, they had acquired the disease. It follows, therefore, that with all possible precautions on their part, gentlemen who are shaved in public places may there get simple ringworm or its later stage, sycosis.

How this may happen is very easily explained. To these shops, (or saloons as they claim to be called,) in addition to the regular customers who are not shaved elsewhere, there resort an irregular set of residents, who are shaved sometimes in one place, sometimes in another, and also a large and ever changing multitude of travellers. It is evident that opportunity for the entrance to a shop of cases of so common an affection as ringworm, or of one so chronic as sycosis, in all this shifting multitude, will not be wanting. Were there any doubt upon this point it would vanish with the statement of the fact that many of the patients here spoken of had continued to be shaved at the place where they took the disease after it was fully developed. The question is, how it may be communicated from one customer to another, both of whom have their own equipments, which we will accept as reserved for their individual use? The operator uses not only the brush, but his hands also, in lathering a face thus affected. These are not always washed before they are applied to the face or apparatus of another; the razor is first stropped, without thorough cleansing perhaps, upon the common strop, even while the act of shaving is only half finished, it may be; the towel used in wiping the face of the first goes not upon a few afterwards; the comb, used upon parts of the face not shaven but yet similarly affected, goes directly to the beard of the next comer. These are the channels of communication by which these parasitic cells, so small as to be invisible, and incapable of destruction by the soap, water or washes used during the process of shaving, may gain passage from one face to another, even when all possible precautions are observed by the regular patrons; when the common property and apparatus of the shop are employed, the danger of conveyance is of course largely increased. There are, however, other ways in which the disease may be transferred. The danger of infection is not only for the person shaved; the operator himself may take the disease. I have treated in several instances ring-

worm upon the hands and fingers of barbers. To how many of their customers may they in turn not have given it?

It will be seen, therefore, how important a part the barber's shop may play in the maintenance and transmission of Tinea tonsurans. From it as a starting-point the disease is carried home and given to other members of the family, or even, and not unfrequently, taken by young gentlemen into other families. There can be no doubt, too, that herpes tonsurans of the scalp may be conveyed from one boy's head to another in a similar way by the hair-cutter; but this is a danger far less to be feared than that of the barber's shop, for the affection of the scalp among cleanly children is comparatively rare, while that of the face in gentlemen who resort to the latter place, on the contrary, is by no means rare.

The following, among many instances which might be cited, will illustrate the contagious and persistent character of some of the forms of Tinea tonsurans:—

In an asylum for orphans in this city, containing about two hundred inmates, ringworm of the scalp had been long prevalent, and the affected children had been allowed to mingle at will with the others. The thirty thus affected were subsequently kept in a separate portion of the building, entirely shut off from all communication with the other inmates, and subjected to treatment. The spread of the affection ceased, and no new cases occurred, except among the newly-received children who brought it with them, and who were at once placed in quarantine. It was hardly possible that so many heads could be properly attended to, and consequently the cure was prolonged in some instances for more than a year, and in a few the affection reappeared after apparent recovery. Among the latter class was one who was put out to service before the disease was completely eradicated, and upon whose head it returned after entering her new home. In this household were three children, all below the age of ten. Several months after her arrival, I was called to examine the heads of the two oldest, and found upon them well-marked herpes tonsurans. In several weeks the youngest also showed unmistakable signs of the same affection, although its progress was at once checked. In the course of a few months a little cousin from the country came to reside in the family, and in six weeks the disease had also

communicated itself to him. In two of these cases, in addition to the affection of the scalp, there were well-marked ringworms upon the face and neck. In the asylum, from which the disease was brought, it should also be stated, in two of the nurses, who had long had charge of the cases there, the nails were greatly disorganized by the growth in their substance of the fungus.

Some time ago I was consulted by a young lady, Miss X., who for fifteen months had been treated for ringworm upon the face and neck. The disease rapidly yielded to remedies where properly applied, but certain portions of the skin, difficult of access and hidden from view, were never quite thoroughly attended to, so that fresh growths of the plant were constantly springing up on the arms, neck, shoulders, and other parts, which might have been easily and permanently killed by thorough attention. * * * * A month after Miss X. was first seen by me, a lad, Master Y., five years old, who had been much with her at the sea-shore, exhibited a circular patch of herpes tonsurans upon the scalp some two inches in diameter, which soon yielded to treatment, and did not return. In the spring of the following year, the mother of Miss X. brought to me a younger daughter with a well-defined ringworm as large as a silver dollar upon the arm, which at once disappeared under treatment. * * * * Again, in October of the same year, I was called to see Miss Y., the sister of Master Y., just mentioned, and the intimate friend of Miss X., the original and constant patient, whom she had been lately visiting. In her case there were four distinct rings of the disease upon the left cheek, which were shortly destroyed by the remedies applied. * * * * Here, then, were three persons affected in succession by the same patient, all of whom might likewise have served as centres for the spread of the disease had they not received prompt treatment.

The following cases are briefly described in illustration of the dangers of public shaving, not only to the persons immediately exposed, but to those with whom they associate:—

A year ago Mr. K. acquired a ringworm of the beard at a barber's shop in a town near this city, which persisted for several months under the domestic remedies at first used. During the past summer his sister consulted me for a ringworm of the face, contracted beyond question from her brother.

Mr. G. consulted me last spring for sycosis of the beard of many months' duration, the sequel of a ringworm of the face coming on after being shaved, contrary to his usual custom, at a barber's shop. On learning the nature of the affection and its contagious character, he informed me that his wife and child were possibly affected by the same disease. I subsequently saw them, and found several well-marked ringworms on the face and arms of the former, and one large ring upon the face of her infant.

Mr. F., after being shaved in Washington, in 1870, brought home a ringworm upon his face. In spite of the use of several domestic remedies, it lingered and continued to spread. He came to see me with his wife. At that time the disease was largely scattered through his beard, as well as upon the chin. His wife had acquired it also, and presented well-developed ringworms of the face.

Mr. S. acquired a ringworm at a barber's shop two years ago in an adjoining city, in which shop four other gentlemen whom I saw, and not a few others, also, according to their statement, were similarly infected. Mr. S. had not been affected but a few weeks, during which several new rings appeared, before the young lady to whom he was engaged to be married applied to me also for relief, having a well-defined ringworm upon her cheek. The possibility of contact with the face of Mr. S. was not denied.

In these cases, sister, wife, child, and *fiancée* were secondarily infected by the barber's shop. They represent a multitude of similar instances within my own experience, but will serve as well as many the purpose for which they are here introduced.

Tinea tonsurans is to be guarded against, therefore, in the school, whenever a child in attendance is known to be affected by it in any form; in the barber's shop, always; at home, when brought into it by any one member of the family; and at times upon the skins of the domestic animals.

Tinea versicolor.

Pityriasis versicolor is less frequently brought to the notice of the dermatologist than herpes tonsurans, but its real prevalence cannot be estimated. In the first place, its nature keeps it from the light, and therefore out of sight; and secondly, it causes

the patient comparatively little trouble, so that he seldom consults his physician until it has existed for a long time and spread over an extensive surface. It is, in fact, often first discovered by the latter when the patient's person is inspected for other purposes, as already mentioned. In Mr. Wilson's 10,000 cases it occurred 131 times; in my own observation of private patients, 13 times in 1,000. Among hospital patients, 14 times in 1,000. The ratio it bears to other cutaneous diseases seems to be remarkably constant, therefore, in the two countries and among all classes of society, although these figures cannot be relied upon as to its absolute occurrence, as in the two former parasitic affections. It is contagious, but in a low degree, and its direct transference from one individual to another is seldom observed except among those living upon the closest terms of personal intimacy; even under these conditions it often fails to be communicated. How else than in this way it originates upon a person, we have no means of knowing.

Tinea decalvans.

With regard to the prevention of the parasitic form of Alopecia areata we have hardly a word to say, except that it is evidently a very rare affection, and therefore but little danger from it is to be feared. How freely it may be communicated, our insufficient data will not allow us to determine. An instance of its spread from a single child to some thirty inmates of an English school, and the fact that my own two cases occurred upon intimate companions, suggest that it may be readily transferred from one host to another.

Myringomycosis.

As to the prevalence of this disease our knowledge is scanty and of recent date. Dr. J. O. Green, aurist of the city hospital, and Dr. C. J. Blake, of the Eye and Ear Infirmary, have kindly furnished me with the following information, by which it appears that it is by no means a common affection here.

Dr. Green writes: "In 755 consecutive cases in private practice, I have found only four cases of parasitic growth where the parasite seemed to me to cause any symptoms. These cases included two of so-called aspergillus glaucus, one of A. nigricans, and one of the simplest form, viz., round or oval single cells. In

addition to these, in thirty-three microscopic examinations of various masses removed from ears, some in private practice and some at the hospital, I found in three undoubted vegetable growth, which I classified at the time as penicillium."

Dr. Blake says: "I have had, I think, but five cases of myringomycosis, and of these four occurred in private practice."

Several of the other aural surgeons of the city, of whom I made similar inquiries, state that they have seen but one or two cases each.

Our knowledge of means of preventing infection is likewise very scanty. Of Wreden's ten cases, the fungus was found in both ears in four, and one case narrated by him seems highly suggestive. The affection in this patient was obstinate, and the relapses were unusually frequent. On examining his sleeping-chamber, the window near the head of his bed was found covered with the growth of aspergillus.

There remains to be mentioned only a single rule applicable to the management of all these affections before professional advice is obtained.

All articles of clothing which have been worn in contact with parts upon which the parasite grows should be purified by immersion in boiling water, or, where the nature of the material does not permit this, by baking. All bed-linen, bandages, brushes, combs, and towels, or other articles suspected of similar contact, should be treated in the same way, and, of course, should be used by no other person until thus purified. The patient, if a child, should be kept by itself as far as possible, and those having charge of the case should thoroughly wash themselves after handling the parts affected. With such precautions there is but little danger that the disease will be transferred to others, and when proper treatment has been once put in operation such danger of infection is far less.

SMALL-POX IN MASSACHUSETTS.

By THE SECRETARY.

SMALL-POX IN MASSACHUSETTS.

This loathsome disease has never been completely eradicated from any country of large extent in which its seed has once fallen. Every year since the system of registration was commenced in Massachusetts has had its record of deaths from this cause. In twenty-eight years small-pox has destroyed a little over three thousand lives, the numbers in each year rising sometimes as high as three hundred, and again falling as low as twelve. In view of the statement so often and so confidently made, that the protective power of vaccine has gradually diminished in its passage through the bodies of so many millions of people since its first use by Jenner, it is interesting to observe that the mortality from small-pox in Massachusetts has not progressively increased, as might have been expected if such deterioration of vaccine were taking place. Thus we find that in 1868 there were but twenty deaths from small-pox, in 1869 but fifty-nine, and in 1870 one hundred and thirty-one, thirty-six of which number were in a single town (Holyoke). The average of these three years, the last of which we have complete records, is lower than the annual average of the past quarter of a century.

The mortality from small-pox in the State for 1871 is as yet unreported by the town clerks, but it is very certain that it has been greater than usual, and that it has occurred for the most part *in a few places*.

Early in the year the subject of small-pox engaged the attention of our Board. The outbreak at Holyoke, in the autumn of 1870, was alarming. We then received accounts from the Metropolitan Board of Health of its prevalence in New York. A few cases occurred in the towns near Holyoke, in the Connecticut Valley. A family in Lowell recently arrived from Europe was attacked, and the nature of the disease was for a time

concealed from the authorities, until the poison got scattered about the neighborhood as should not have occurred. The medical journals of France and England reported a sudden accession of virulence in the disease, or an increased susceptibility to its influence observed in various parts of Europe.

Under these circumstances the following circular was sent to the health authorities of every town in Massachusetts:—

[Circular.]

COMMONWEALTH OF MASSACHUSETTS,

STATE BOARD OF HEALTH, BOSTON, April 10, 1871.

To the Mayors of cities, and Selectmen of towns in Massachusetts.

GENTLEMEN:—At a meeting of State Board of Health, held April 5th, 1871, we were directed to communicate with you on the subject of *vaccination*.

There is reason to believe from information received from various parts of the State, that a very large number of people, of all ages, are at the present time unprotected against small-pox.

The laws of nature governing the spread of epidemics are not always clearly understood; but we know that small-pox may certainly be propagated among the unvaccinated by contagion or infection; and this not only by actual contact of person or clothing, but also through the air surrounding those affected with the disease.

Moreover, there is much evidence to make it probable that a marked disposition to contract the disease exists at certain times, and spreads over a great extent of territory.

Before vaccination was introduced by Dr. Jenner, this "epidemic influence" was perfectly evident, occurring at various intervals, and sometimes more than once in a generation.

This same "epidemic influence" may be also traced in the present century, and when it occurs those who are not protected by complete and efficient vaccination are exposed to great danger.

The present epidemic of small-pox in the city of New York, and the recent outbreaks at Holyoke, and several other towns of this State, should be taken by us as warnings to be prepared for this loathsome and destructive disease.

By the use of your personal influence, and the exercise of as much of the complete authority given you by chapter 26, sections 27–31, General Statutes of Massachusetts, as may seem expedient, we believe many lives may be saved and much suffering avoided in the future. And we would especially urge upon you the importance of

protecting the people by careful vaccination before small-pox appears among you.

We remain, in behalf of the State Board of Health,
Very respectfully, your obedient servants,
HENRY I. BOWDITCH, *Chairman.*
GEORGE DERBY, *Secretary.*

It is hoped and believed that the preceding circular was the means of saving life. It certainly contributed to the general interest in the subject which has prevailed, and which has led to a more complete vaccination of the people. Small-pox has found a secure foothold in very few places. Among the twenty most populous cities and towns it has been epidemic in Lowell and Holyoke, and in none others. It has appeared in Worcester, and has been driven out by the vigilance of the health authorities, the deaths numbering but two in ten months. It has tried Springfield and failed. Boston has been almost entirely exempt, and the same may be said of the large cities in its immediate vicinity. In many smaller places cases have occurred, but the disease has only spread in Lowell and Holyoke, and there can be little doubt that it would have been quickly extinguished there if, *at the first outbreak*, the health authorities had acted with more promptness and decision.

"*Principiis obsta*"—stop the first beginnings—can have no more useful application than in dealing with small-pox; and that this has not always been done is partly at least the fault of the State laws relating to the subject. Lowell and Holyoke have a large foreign population of young persons, including many French Canadians. These people are notoriously perverse in refusing vaccination, and when sick with small-pox conceal if possible the nature of their disease. Neither their ignorance nor their foolhardiness should be allowed to endanger the lives of those among whom they dwell.

In a circular dated May 6th, 1871, and addressed to our medical correspondents in all parts of the State, the following question was asked: "Are the people protected from small-pox by vaccination?" The replies have come in from all quarters, and their general purport is that the people are protected. In several instances it is stated that a great number of vaccinations have been made during the past year and that a renewed inter-

est in the subject has been recently observed. But from a good many towns comes a different report. The following are instances:—

Ayer.—"The children are well protected by vaccination. One-third at least of the adults have not been vaccinated since childhood."

Athol.—"No efforts have as yet been made by the town to secure complete vaccination. In consequence of the Holyoke epidemic there has been attention given to the subject on the part of many individuals."

Beverly.—"People are not protected as they should be."

Charlestown.—"There have been many unvaccinated children attending school." Our correspondent has induced the health authorities to make better provisions for gratuitous vaccination.

Colrain.—"People are not very well protected. There is a criminal indifference to the subject."

Cheshire.—"There has been no general vaccination of the town for the last ten or fourteen years, and it contains a large Irish population unvaccinated."

Chicopee.—"During the prevalence of small-pox in the adjacent town of Holyoke last winter, our town authorities took measures to have a thorough vaccination throughout the town and neighborhood; and we had the satisfaction of completely heading off the disease. I found that about twenty per cent. of my re-vaccinations, where there were good scars, showed perfect or nearly perfect vaccine pustules."

Essex.—"I have reason to believe it is too much neglected in this town. I occasionally meet with persons sixteen years of age and upwards who have never been vaccinated."

Hudson.—"The French residents as a class object to vaccination."

Hopkinton.—"Vaccination has been much neglected and very many are unprotected."

Leverett.—"Vaccination neglected."

Nahant.—"There are numbers of babies in the Irish class that have not been vaccinated."

Newton Corner.—"Children are allowed to enter the public schools who have not been vaccinated."

Pembroke.—"Vaccination is very much neglected. There must be a good many unvaccinated children in our schools."

Prescott.—"I do not think the people are protected from small-pox by vaccination as fully as they ought to be. I think one-fourth of the people are not vaccinated."

Reading.—"Vaccination is not made a requisite for admission to the public schools."

Rowe.—"I regret to say that vaccination is greatly neglected. The law is palpably defective.

Stoneham.—"A certain proportion of the foreign population are careless about vaccination, and for these, in my opinion, some public provision should be made."

Topsfield.—"The vaccination of children is not attended to as early as it ought to be."

Worcester.—Our correspondent, as city physician, has had to deal with several outbreaks of small-pox, and has dealt with them successfully. He is of opinion that the laws of the State with regard to both vaccination and small-pox are in need of revision. A great many foreigners (particularly French Canadians,) and young children are unvaccinated.

There are two ways in which the people may be protected from small-pox in the future, neither completely effectual, but each supplementing the other, and both combined rendering any community proof against an epidemic of this disease.

The first of course is vaccination, and the second, such isolation of the cases which do occur as may make the extension of the disease impossible. The first invests the human body with

an armor which may hardly be penetrated by this subtle poison ; the second destroys the poison itself.

Every community should, for the general safety, have ample power given to its health authorities to use both these methods at their discretion, and with perfect freedom.

Vaccination needs no defence from us. Nothing, however beneficent, can escape the criticism of the times in which we live. But this criticism of vaccination, often passionate and violent, relates chiefly to points which, however interesting they may be, leave the main question unaffected. Let any one read the history of the ravages of small-pox before Jenner's discovery, and compare it with the mortality of Massachusetts from this cause in the present generation, and ask himself the reason for this change. There can be but one answer.

We may speculate about the possibility of the potency of vaccine being exhausted in the human family, we may be surprised to find that people with good vaccine scars sometimes have small-pox, we may dispute as much as we please about the average period when re-vaccination may be considered a prudent safeguard, we may even conjecture (what no man has proved), that other diseases than that of the cow may be communicated by humanized vaccine, we may turn the vaccination question with ingenious skill, so that its many facets shall reflect a multitude of curious lights, and after all we find that we rest in a security against this most horrid pestilence unknown to former generations. The disease is the same now as then, for we see its effects among barbarous tribes, but because Dr. Jenner lived and made the greatest of all discoveries in preventive medicine, we are almost completely safe.

The present law of the State concerning vaccination gives the boards of health all needed power, except that it allows two years for the vaccination of children. It would have been better to require it in the first six months. There seems to be no reason why four per cent. of the whole living population should be legally permitted to furnish food for the pestilence. It may be said of *primary* vaccination that it is free from danger, and vaccination in the first few months of life has been proved to be safe by an experience of millions of cases in every civilized country.

But the great defect in our law concerning small-pox may be

found in a single section, and is expressed in two lines of prohibition. Chapter 26, General Statutes of Massachusetts provides that persons affected with *diseases dangerous to public health* may, if in the judgment of the health authorities it be needful, be removed to hospitals specially prepared for their use, or be so guarded in their own dwellings that the public may be safe from contagion.

Section 51 of the same chapter then provides that these laws for the isolation of persons affected with diseases liable to spread by contagion, "*shall not apply to small-pox.*"

This prohibition has cost the State a good many lives during the past year, has interrupted great industrial interests, and has brought a heavy bill of expense upon the cities and towns whose health authorities were so restricted. For we deem it certain that the epidemic which has existed in Holyoke and Lowell, might have been extinguished at its very outbreak by the separation of the sick from the well.

As the law now stands there is no clear and definite authority given to Boards of Health to prevent a person sick with small pox from scattering the poison in all directions. His house may be freely visited, no danger-flags can be legally set up, and when able to walk about, with the scabs containing the concentrated virus still adherent to his skin or his clothing, he may go where he likes.

There can be no doubt that if this 51st section were repealed and the Boards of Health of cities and towns thus empowered to deal with small-pox as with cholera or yellow fever, such authority would not be harshly or unjustly used. In by far the greater number of places and with the great majority of patients, removal to a small-pox hospital would not be necessary. Among reasonable and trustworthy people such regulations could be made in their own homes as would secure the required isolation. But we have in our cities and great manufacturing towns a class of irresponsible, ignorant and reckless persons who can only be controlled by law. Such persons should be removed from the crowded dwellings in which they live when the public safety demands it.

As regards their destructive effects small-pox and common fire need similar restrictions. Let us endeavor to make the people small-pox-proof as we make buildings fire-proof, but let us not neglect the means of isolation and extinction.

HEALTH OF TOWNS.

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Under this head are arranged extracts from letters of our medical correspondents in Massachusetts giving information concerning subjects not otherwise specially treated in this Report. They include such facts and opinions concerning typhoid fever, and poisoning by lead, as have been sent to us since the publication of the Report of 1871, together with some interesting speculations concerning the probable causes of disease which will point the way to special investigations in the future. Many valuable letters concerning "consumption—its causes and prevention," and also concerning the "food of the people," have been received, but their publication is for the present reserved. The latter subject would have been considered in the Report of the present year but for the duties which have devolved upon the Secretary in connection with the Act of April 8, 1871, relating to "slaughtering and noxious and offensive trades."

Acton.—"Since certain ponds have been filled in with soil and have lost their influence as 'centres of deadly miasm' during the summer, the town is believed to be preëminently healthy."

Attleboro'.—"Typhoid fever and dysentery prevail from August to December; but both diseases are seldom rife the same season. Last autumn (1870) typhoid was wide-spread and many cases were of a grave character, complicated with abdominal hemorrhage and pneumonia. Although the fever was confined to certain localities, and in some instances attacked three or more individuals in the same house, it was impossible to discover any direct source of contamination. The families were nearly all in good circumstances, living in clean, well-kept houses, with no obvious source of impurity in food, drink or air. Wells were isolated from privies and drains, and careful search from cellar to roof disclosed no focus of

disease. The season was extremely dry, the surface parched, and the wells low or exhausted. The tracts where the fever most prevailed were lower than the contiguous neighborhood; and in the spring, the section was saturated with water, and the cellars remained wet for some time. The epidemic occurred at the period of lowest water-level. The district has a good exposure to sunlight and free circulation of air. The only deleterious condition common to the district was the low water."

Ayer.—Pulmonary affections are common. Pneumonia, which has been specially prevalent the past year, has been undoubtedly due to sudden changes of temperature, and to the unusual amount of rain instead of snow during the winter. There are more cases of consumption here than in adjoining towns, attributable rather to great neglect of hygienic laws, especially of ventilation, than to any topographical peculiarities of the town. Proportionally, more cases of phthisis occur among the foreign population, where the ignorance concerning the laws of health is greatest. During and after the hot season of 1870, while the "mill-pond" south of the village was nearly dry and contained an exposed mass of decaying vegetable matter, and while a majority of the wells of the town were dry, an epidemic of typhoid fever occurred, the first in many years. Our correspondent deems this annual condition of stagnation and vegetable decay in the ponds a prolific source of disease, and especially of typhoid fever.

Amherst.—Typhoid fever has been especially prevalent, determined by moisture of soil in some parts of the town and defective drainage, which in part at least could be easily remedied. The air of the town is pure and its situation is exposed.

Boston.—The causes of preventable disease specially described in our report of last year (pp. 55–62 and 350–368), remain in full force. They exist to-day in Boston as the causes of preventable fire existed in Chicago before the late disaster—unheeded by the mass of the people intent on their daily business, and suffered to remain by those whose immediate duty it is to remove them. The streets and alleys and vaults and tenement houses are as dirty as ever. Unsound provisions are as freely sold. Great tracts of undrained and undrainable land are being built up, to be raised at a future day at enormous cost, but meanwhile exposing their occupants to dangers from which they should be shielded by public authority. We have been as free from destructive epidemics dur-

ing the past year as was the city of Buenos Ayres for many years before the destroyer came. But we have fostered those elements on which the seeds of death will thrive whenever they fall among us. In every part of old Boston there are foul places, unseen by the passer-by, but perfectly well known to physicians, ready to nourish a pestilence, and to scatter it in every direction among those who live in seeming security. No man can protect himself and his family against such danger. It must be done by public authority and for the common good.

The present condition of law in Boston on these special questions relating to the maintenance of public health and the prevention of disease is perhaps more unsatisfactory than ever before, and yet there are indications, to which we will presently refer, which point beyond doubt to such awakening of public interest in the subject as will finally lead to reform.

The tenement-house law of 1868, chapter 281, General Statutes, whose execution was vested exclusively in the Board of Health of the city of Boston, was repealed by the last legislature.

During the three years of its existence no effort was made to enforce it, and our tenement houses went from bad to worse. The law was based upon one which has worked well in the city of New York, and whose effect may be seen in thousands of clean, orderly, well-lighted and ventilated tenement houses, provided with good privies connected with the sewers, with fire-escapes, and with water. In the one city the law was executed, and under extraordinary difficulties; in the other, no attempt was made to execute it.

Our tenement-house law was repealed on the passage of an Act, chapter 280, General Statutes 1871, which is known as the "building law." Many of the provisions of the old tenement-house law are retained in this very elaborate and complicated statute, but their execution must still be *at the instance of the City Board of Health*, and there is therefore no more to hope from it in this regard than from its predecessor.

The remedy for this state of affairs has been brought prominently before the city council during the past year, and has been warmly recommended by the present mayor in his inaugural address. It consists in a transfer of all the authority of a Board of Health from the Board of Aldermen to an independent board of five or more persons not members of the city councils, and holding office for a term of years. From such a board, including as has been proposed, two or more physicians and a lawyer (and we would also add, a civil engineer), removed by the tenure of their position as far as possible from political influences, the best results might be expected.

It has been often stated in the discussions of this contemplated change of authority that it is impossible for members of the Board of Aldermen to give the time needful for the discharge of such responsible duties in connection with public health as now legally belong to them, in addition to the weighty questions of every kind which constantly press for a decision. The aldermen of the city are not chosen with any regard for their fitness to comprehend sanitary questions, and although they may and do command respect for their faithful and gratuitous performance of very onerous labor, it cannot be wondered at that, as health-guardians of a great city like Boston, they fail. As the city increases their inadequacy to meet the demand must constantly become more conspicuous, and it will also inevitably entail a great and needless burden of cost upon our successors. The same wise forecast which leads our commercial interests to widen streets and make broad avenues for the business of the future, should lead us, through the teachings of Franklin's political economy, to provide for the preservation of human life and human health; for these are as truly wealth as are cotton or iron.

The time has surely passed for limiting the health duties of the city of Boston to the abatement of petty and isolated nuisances, which have simply become intolerable. Our commercial, as well as our physical and moral interests require us to take a broader view of the subject—to prevent the formation of causes of disease and of public discomfort,—to establish a system for the immediate removal of all material of whatever kind liable to suffer decay,—to establish plans of drainage adequate for our whole territory and harmonious in all their parts, and to prevent the occupation of lands whose complete drainage is not already provided for,—to seize and confiscate all provisions offered for sale which may be unfit for food,—to see to it that the occupants of our tenement-houses are helped in those essentials to health (air, water and sunlight) in which they are powerless to help themselves,—to open our blind alleys and narrow courts, and thus break up our nurseries of infantile cholera and intestinal disorder,—to purge and purify our "Institute avenues" and all similar plague spots, and to prevent their formation in the future.

All this and much more can be done by a well-constituted Boston Board of Health, with the influence of all citizens who wish for reform supporting their efforts and strengthening their hands.

The death-rate of Boston for 1871, based on the census of 1870, was 23.50 per thousand. This includes 518 deaths from cholera infantum.

Becket.—Bilious and typhoid fevers have been prevalent.

Belchertown.—"Inflammatory rheumatism more prevalent in the spring of 1871 than at any time during the past sixteen years." No special cause assignable. "We are on a hill, freely exposed to winds from all directions; soil, naturally damp, pervious to water, but springy; sunlight, free."

Berkley.—"A mild form of diphtheria has prevailed the last eight or ten years," attributed to no distinct local influences.

Brimfield.—"This township is mostly situated on elevated land, the subsoil of which is clayey and retentive of moisture; but little attention is paid to drainage. The standard of health is fully equal and probably superior to that of the surrounding towns." Our correspondent reiterates his observation of last year that "the loathsome emanations from pig-sties, sink-drains and privies are the cause of a very respectable proportion of the acute diseases" which occur under his observation.

Canton.—"During the summer and autumn months of 1870, we had an epidemic of fevers,—a few typhoid, others varied by some constitutional peculiarity. The cause was the opening of a new race-way at one of the mills; but since the removal of the displaced earth, the disease has subsided. The soil of the town is sandy loam; dry, not exposed to any foul air, and sunlight is abundant."

Clinton.—"The only diseases which can be said to be prevalent are scarlet fever and cholera among children. A large number of the deaths are from these diseases. They occur chiefly among the foreign population who work in our factories, and the deaths are, in my opinion, largely increased by overcrowding, filth and neglect.

"This is a river town, with interval lands rising to hills, with some sandy plains. I think there are more deaths in the valleys, in proportion to the number of the inhabitants.

"Sunlight, abundant. Soil is pervious in some parts, impervious in others. Drainage about the factories good. Town not particularly exposed to wind.

"There are situated on Grove Street, Clinton, in a space of twenty rods, eighteen tenement houses and one large boarding-house, belonging to the 'Lancaster Mills' corporation. In August, 1869,

there were six cases of well-marked typhoid fever, all severe, and one terminating fatally, in this street. The fact that there were so many cases in so small a locality, the rest of the town being free from the disease, led me to suppose there might be a local origin.

"On examination, I found that the sewage of these houses was emptied into a ravine at the end of the street, and was there spread out upon a little plat of ground of perhaps a quarter of an acre in extent, where it remained on the surface, exhaling an offensive odor which the prevailing west winds carried through the street, contaminating the air to a sensible degree. I immediately notified the agent of the corporation, who caused the sewer to be continued to a distance from the houses, to a brook in the ravine, and not another case occurred after the extension of the sewer.

"I have no doubt that these cases of typhoid fever were produced by the putrid sink water before mentioned. One case proves nothing, but I offer this as one fact, to add to the general stock of information upon the subject of the causes of typhoid fever.

"My attention has never been called to the height of subsoil water."

"In August and September of 1870, an epidemic of lead disease appeared among the operatives of the Lancaster Mills in Clinton. The Lancaster Mills manufacture the "Lancaster ginghams," and employ about one thousand operatives. Their tenements are supplied with water for domestic purposes from the Nashua River; it is forced into a reservoir on an eminence through iron pipes, and thence distributed to the houses by iron pipes, and to the rooms in each house by lead pipes. During an experience of twenty-five years, no lead disease was known in these tenements until August 7, 1870. From that time until September 8th, fourteen cases occurred, presenting the characteristic symptoms. I now notified the superintendent that I was afraid he would be obliged to remove all the lead pipes, as new cases were appearing every day or two. On investigation I found that in several instances only a few feet of lead pipe was in use, and in some none at all, so that the fault could not be in the lead pipe. It then occurred to me that the sufferers were all Germans, and that the disease might be caused by drinking beer from leaden or pewter vessels or drawn through leaden faucets. But on examination I found that they all used glass drinking vessels, and that two of the patients never drank beer of any kind; and just at this time two Scotchmen were attacked. It was evident that lead was the cause of the disease, but from what source was it derived? I could find no article of food, no condiment that was in general use, but still the cases increased, and at length appeared

among native-born operatives. Upon looking over the cases it was noticed that the sufferers were all weavers, and on further interrogation, "what colors they were weaving?"—I found invariably the answer was, "orange and blue." On examining the shuttles in the looms standing idle, an orange-colored dust was found, which on analysis by the chemist of the company was found to be chromate of lead, and all the weavers said they had never known so much dust in the shuttles as during the last few weeks while using the orange-colored yarn. Here was something tangible. The yarn is dyed by dipping it in a solution of acetate of lead, then in a solution of bichromate of potassa; the result is (with further manipulation which it is not necessary to mention here), a chromate of lead of a fine orange tint. The shuttle is threaded by drawing the thread through the eye of the shuttle by suction of the mouth.

"Immediately hooks were furnished to all the weavers to draw in their threads, and they were forbidden to "suck in" the thread. The orange yarn was found to be loaded with a superabundance of chromate of lead, owing to a faulty method of dyeing; this was rectified, and the disease very soon disappeared, but not till three men had had a second attack, and one poor fellow, who was one of the first attacked, was seized with convulsions (lead encephalopathy), of which he died on the third day.

"The obscurity in these cases was not in the diagnosis but in the source of the poison. It took six weeks to find this out, and in the investigation I was much assisted by the superintendent of the mills. In all, I had twenty-two cases in my own practice, and I heard of several in the care of other physicians.

"One peculiarity was the fact that relief to the pain did not follow purgation except in a few cases, and in some of the cases there was no constipation.

"In regard to the general question of lead colic or lead disease, caused by water passing through lead pipes, I would say that in my opinion nineteen-twentieths of the houses in Clinton are supplied with water by means of lead pipe; of these, perhaps 150 families are supplied from the Nashua River, the water being pumped into a reservoir and distributed by lead pipes as before mentioned; the remainder of the town is supplied from wells, except a few families who are supplied from a spring through lead pipe. I have never known of a case of lead disease in town where the water was pure soft water or river water, but have had several cases in which the water was hard. In one section called 'Burdett Hill,' I have had seven cases (I mean seven families) that were made ill by using water passing through lead pipe. In one case

three families in succession were made sick from one well, each recovering on ceasing to use the water. This water was very hard, containing carbonic acid, chloride of sodium and sulphate and sulphuret of iron.

"In my experience with lead disease, I have found these the most marked symptoms,—pain, constipation, a yellowish complexion, not affecting the eyes nor staining the shirt, nor coloring the urine as in ordinary jaundice, and (the most constant and certain) the blue or slatish-colored line on the gums. This line is confined to that portion of the gums which overlaps a tooth; and moreover it is very slight in persons who habitually use the tooth-brush, and very marked in those who have accumulations of 'tartar,' so called; so that, in examining for this blue line it is important to examine all the teeth, as one will often find cases in which the gums of the incisors are entirely free, not colored, while the molars which, for obvious reasons, do not receive as much attention from the tooth-brush, will be decidedly discolored."

Prescott.—"A disease similar in character to whooping cough and influenza prevailed during the winter and spring of 1871 in the town of Greenwich mostly, though occurring in Prescott to some extent, and with occasional cases in New Salem and Shutesbury. It has seemed to be contagious, like both the diseases alluded to, running through whole families and lasting for several weeks. A portion of the time febrile symptoms would be present, and the cough would continue after they had subsided. The cough was peculiar, resembling whooping cough very much, being spasmodic, and in many cases so severe that the only relief they could obtain was by being carried into the open air, even if it were in the night. The breath would be expired continuously, without ability to inspire until the stimulus of cold and pure air was afforded. This seemed like whooping cough; but there was a negative element,—a great many people, and some of them sixty to seventy years of age, have had the same, although they had had whooping cough while young.

"In treatment the disease was very obstinate, all ordinary expectorants and cough-mixtures seeming to do but little good. I can hardly account for this violent form of influenza, for I have called the disease influenza, with spasmodic cough; it appeared as an epidemic and disappeared in a few months.

"The soil of this region is mostly a sandy loam with clay subsoil, the depth of the sand being considerable. The land is mostly level or undulating, being in the valley of one branch of Swift River. Exposure to sunlight and wind not exceptional."

Carver.—"The diseases most prevalent in this locality are typhoid fever, phthisis and diphtheria. There are a great number of ponds in the town and many of them have no outlets. In spring, summer and autumn there are dense fogs from these ponds at night, which hang over the valleys and low grounds. In the heat of summer, bowel complaints, especially dysentery, are very prevalent. The houses where typhoid fever has occurred most frequently are situated near the ponds and on the low grounds."

Charlestown.—No diseases prevail which can be attributed to special local influences. Typhoid fever is believed to depend on the presence of decaying vegetable matter, to dryness of the season, and to the use of hard water; it has been less prevalent since the use of the Mystic water. Uncovered vaults, bad drainage and filth in general are assigned as causes of disease; and cases are alluded to in which typhoid fever disappeared from a neighborhood on the removal of some such noxious condition. "Cases of typhoid do not occur generally on the high land, but around the borders of the city and particularly on the made land." Certain manufactories are cited as exercising a deleterious influence on public health through the noxious vapors which contaminate the air, and their contemplated removal, it is believed, will result in decided benefit.

Cheshire.—Catarrhal fever and pneumonia prevalent; "due, no doubt, to sudden changes in the weather, with variations from wet and warm days to sudden cold snaps." The town is well located as regards soil, air and sunlight.

Colrain.—Enteric and gastro-enteric diseases have prevailed here the past year. Our correspondent thinks they may have been caused in no small degree by the free use of "hard cider." No special local peculiarities of the soil or atmosphere. In the winter of 1870–71, the town was visited by an epidemic of exanthematous disease resembling scarlet fever but having also some of the characters of roseola. Its symptoms were "sore throat, headache, fever and great languor, followed after a variable time by an eruption very much like scarlet fever." It was most frequent with young children and was insignificant in its course and results.

Conway.—Lung diseases and diseases of the nervous system prevail. "The prevalence of pneumonia and consumption is not, in my opinion, so much to be attributed to atmospheric causes and moisture as to carelessness in dressing the young (especially females), and the want of proper ventilation in sleeping-rooms."

Chicopee.—Diseases of the respiratory organs,—bronchitis, tonsillitis, pneumonia and phthisis,—prevail. The situation of the village is low, at the confluence of two rivers, and fogs are very prevalent during the spring and autumn. During the summer months, cholera infantum is epidemic; confined to children of foreign parentage, and very fatal. Medical treatment is found unavailing in the presence of ignorance and miserable surroundings. Improvements in hygiene led on by the manufacturing corporations are becoming manifest.

Danvers.—"We are having a malignant form of scarlet fever at Danvers Port, proving fatal, with ulcerated throats, assuming a gangrenous form. The port is bounded easterly by salt water, and the land has a clay bottom with exceedingly damp surface the whole warm season. Soil, wet and impervious; situation, low; air, damp with a good deal of east wind."

Dedham.—Phthisis and rheumatic fever are common. "Forty years ago, there were more cases of phthisis in West Dedham, where the land is dry and so high that the 'Boston' light-house can be seen. Of late years there has been more of the disease in Dedham, near the banks of Charles river."

Dudley.—Lung diseases prevail. Soil moist, and situation high and exposed to winds. "People keep rather shaded."

Eastham.—"Typhoid fever, and, for the last two years, jaundice, have prevailed. The soil is sandy and dry, low, and generally level. The town is exposed to winds from all points, and is not much shaded."

Easthampton.—"A mild form of scarlatina has been extremely prevalent; in no case of a malignant type, but followed in many instances by sequelæ. From 1853 to 1860, a mild type of typhoid prevailed through Hampshire County; the disease has gradually disappeared, however, and is now quite rare. No satisfactory cause could be assigned for its prevalence, and no change in the sanitary condition of the people has occurred to explain its subsidence." The town has no marked peculiarities of location or exposure; its soil is dry and very pervious.

Everett.—"This town (formerly a part of Malden) slopes toward the south and south-west. The soil is in some parts porous, and in others clayey. Water is good on the uplands, but is impregnated with lime. The town is exposed to bleak east winds, with fogs

near the marshes." Pulmonary diseases, rheumatism and typhoid fever are prevalent, depending for their causes on sudden changes of temperature, and on the ill-ventilation of dwelling-houses. "A few years ago, in one locality, there was a small pond, and the water became stagnant, with a green scum. There were many cases of inflammatory diarrhœa of a typhoid type, and fatal. I am clear in my opinion that there was a miasm from that source."

Falmouth.—Our correspondent gives the detailed history of twelve cases of typhoid fever, occurring within a small district, and originating in "a very old house, the rooms of which were small and ill-ventilated, and inhabited by a large family, whose habits were very uncleanly. The slops and refuse were thrown upon the ground a short distance in the rear of the house. The odor from the rooms was so offensive that it was with the greatest difficulty that watchers could be procured to stay with the patients. Two fatal cases occurred in this family. It seems that the want of proper ventilation and the extreme uncleanliness, if not the sole cause of the disease in the first instance, certainly exercised a powerful influence, the only deaths occurring under these bad hygienic conditions."

Fairhaven.—"Influenza has prevailed very extensively since January 1871. Rheumatism and neuralgia occur frequently, depending on sudden changes of temperature, and some peculiar condition of the atmosphere that we know little or nothing about. Near the seashore the soil is pervious to water and is dry; a short distance from the shore, the soil in most parts of the town is impervious to water. The town is flat and low; underlying it to a great extent is gneiss rock that crops out in many localities. Exposure to south-west winds that come from Long Island Sound. Village much shaded by trees, but the region in general is well exposed to sunlight."

Fitchburg.—Our correspondent calls attention to the very imperfect manner in which some of the work-shops and factories of this town are ventilated. "In one of these the ventilation is shockingly bad. Some 250 to 300 men work in one room, 600 feet long, of a one-story building, with flat roof, and with ventilation by side windows only. I am confident such a condition is a source of defective health, if not of actual disease, to many of the operatives in that shop. The air is loaded with greasy odors, and in a cold day in winter or hot day in summer, the atmosphere is very bad. I do not know how to arouse the corporations to apply an easy remedy.

Perhaps a pestilent and fatal fever among the men might stir them to adopt better and more scientific ventilation."

Gloucester.—The air is rendered foul by the practice of dressing the land in early spring with decaying fish. How far this is detrimental to health, our correspondent thinks not yet proven. Tapeworm is said to be specially prevalent.

Granby.—"This is a remarkably healthy town. The houses are generally exposed to sunlight; the soil is dry; the air is good, without special exposure from any quarter."

Hadley.—"Soil, rather dry, generally pervious. Situation, high. North-west and south-west winds prevail. Fogs frequently prevail in the latter part of summer, arising from the Connecticut River. The prevalent disease is a condition secondary to cerebro-spinal meningitis; it is observed in connection with any condition of unusual debility, and sometimes constitutes the termination of diphtheria, and the diseases incident to childhood and old age.'

Halifax.—"A part of the town is sandy; the rest is flat and through it runs the Winnatuxet river, which empties into the Taunton River. Along the course of this stream are low meadows that are often overflowed in summer and autumn; as this overflow dries up, a very offensive deposit is left, and owing to the low and flat location many of the cellars are wet. In this part of the town we sometimes have typhoid fever. Some years ago, this fever prevailed as an epidemic along the whole length of the section overflowed, and nowhere else. Dysentery is also more common in this part, and so also is scrofula and consumption. It is often remarked that the inhabitants of this locality are not so robust and look paler and are less energetic than those elsewhere."

Hanson.—"In one locality, typhoid fever has been unusually prevalent and severe. The region is near a pond and marsh, and is low and wet."

Huntington.—Typhoid fever and phthisis prevail. Soil, moist; location, low without proper drainage. "The people are becoming more alive to the importance of hygienic measures."

Hopkinton.—"Consumption, typhoid fever, rheumatism, erysipelas and abscesses (especially whitlows) have occurred frequently during the past few years. Hopkinton is very high and exposed to cold winds. The land is springy, and the highest hills seem to

have fully as much moisture as the low lands. Underdraining would be of some service. One of our streets is too much shaded and has had an unusual share of sickness during the last thirty years, chiefly typhoid and bilious fevers."

Lanesboro'.—"Embraces a section of country called the valley of the upper Housatonic. It is thirteen hundred feet above the level of the sea. The valley is unsurpassed for fertility, having a soil that is never affected by drought, being rich loam underlaid by a clay subsoil. It is surrounded by a perfect amphitheatre of hills. Our location is remarkably healthy; the deaths for ten years by consumption will not average 1.5 yearly for every 1,000 inhabitants. There are no prevalent diseases."

Leverett.—"Typhoid fever and pulmonary consumption are the most common diseases and the most fatal. Typhoid is the disease of the autumnal months. Phthisis destroys at least fifteen per cent of the people over twenty years of age." There are no noteworthy local peculiarities.

Leyden.—"Pulmonary complaints are very common; caused by exposures, atmospheric changes and neglect of hygienic principles. The soil of the town is generally dry and pervious to water; its situation is high."

Lincoln.—"A peculiar form of influenza, producing lameness similar to rheumatism, prevailed in March and April, 1871." The region is an agricultural one, with variable surface, plenty of sunlight and few damp localities.

Littleton.—"Consumption quite prevalent; in most cases due to hereditary tendency, and increased, I am convinced, by the frequent consanguineous marriages. Soil moist from annual overflow of Beaver Brook."

Longmeadow.—"No diseases specially prevalent. The situation of the town is high; soil, dry; there is no stagnant water; the air is pure."

Malden.—"No disease has been specially prevalent in our town during the last five years. At all times we are subject to the diseases common to a changeable New England climate. Of those citizens who are not wealthy the majority have the means to enjoy plenty of room in, as well as out of doors. They appreciate the

importance of wholesome food, dry cellars, warm clothing, and pure air and water.

"It has become proverbial among visitors that 'everybody in Malden keeps a horse'—and it adds, no doubt, much to their health as well as happiness.

"For more than a year this town has enjoyed the use of water from Spot Pond, which has thus far proved a great luxury, and will no doubt be conducive to health. The street pipes are lined with cement. Many of the service pipes are galvanized iron, and their effects are less injurious now than when first laid. I have examined several pieces taken up from time to time, and have found them lined with iron rust and oxide of zinc. The longer they are subject to the action of the water the less zinc, and it probably will not be long before the pipe will be rendered useless by the oxidation of the iron."

Mattapoissett.—"In this community I see more ill effects from ill ventilation than from other causes. People will sleep in a seven by nine bed-room, with door and window closed, and with such a general fear of fresh air that I am surprised they continue as well as they appear."

Montague.—"Pneumonia prevailed quite extensively during the winter of 1870–71, and was quite fatal. I can only attribute it to sudden changes of the weather, and to want of care and of protection by proper clothing. The town is situated in the Connecticut Valley, rather low, with a dry, sandy, pervious soil."

Nahant.—"The chief source of trouble to health is the habit of people here in winter of closing up the houses and living in rooms overheated with air-tight stoves."

Newburyport.—"I think we have more deaths from phthisis than any other disease. The soil is dry, pervious to water, and so graded by nature that the drainage is perfect. Every rain washes the streets and gutters, and carries all the effete matter into the river. We are blessed with a clear, pure air, and, during the hot summer weather, the heat is tempered by the cool east winds."

Orleans.—Zymotic diseases frequent. The soil is dry and sandy, except near the numerous inlets of the sea, which encroach on the land, and which are bordered by low, marshy ground. When north and north-east winds blow, they are accompanied with a salt-water fog, not injurious to health.

Pittsfield.—"No disease has prevailed to any remarkable extent during the past year.

"All cases of typhoid fever that I have investigated are traceable to local and removable causes.

"Soil generally dry and gravelly, with a few patches of hardpan. Land is elevated. Air pure. High winds from the north-west are prevalent.

"Parts of the town are much shaded with elms and maples.

"Typhoid fever has been less than usually prevalent the past season, and generally of a mild type, with very few deaths, and but few of the cases exceeding two weeks in duration. Several striking instances of *local cause* have come under my notice.

"In August, four cases and one death occurred among the French charcoal burners, who live high up on the side of the Taconic range of mountains. They occupy two log-houses, one perched on the steep side of the mountain, at a considerable elevation, commanding a very extended view to the east and south, and the other not quite so high, in a deep, dark gorge, between two summits. Each house gives shelter to about sixteen men, women and children, who are crowded together like sardines in a box. The houses are internally clean, and are supplied with pure spring water.

"The first case of fever, a very virulent one, was a young girl living in the house on the open hill-side. She recovered, although for two weeks she seemed at the point of death. In seeking for a local cause, I found that, on the side of the house toward the mountain, the window-sills were at the level of the ground, the house being partially underground on that side. Close to the house on this side, coming within a few inches of the wall, was a large stagnant pool, formed by the trickling of a small spring. Into this pool most of the house slops were thrown, so that a filthy pool stood four feet above the level of the floor, and almost running into the windows. About the two doors, on the exposed side of the house, decaying vegetables and slops were thrown, but the spring from which drinking water was obtained, about three rods from the house, appeared not to be contaminated. The patient had not been away from home for more than a month previous to her illness, nor had she in any way been exposed to other than local agencies. Three weeks after she was attacked, three cases of fever appeared in the other house referred to, in the gorge. One died, the other two recovered. This house is wholly aboveground, but slops were thrown out about the doors. In the second story, which is directly under the roof, with the floor level with the eaves, eight men slept, the room being about 24 × 12 feet. Daily communica-

tion was had between the two houses, which are about half a mile apart. These houses are about five miles from the village of Pittsfield, and two miles from any other dwellings. Fever was not prevailing in the valley, and the cases appear to me valuable and suggestive ones in considering the causes of typhoid fever.

"Another set of cases occurred in September in a part of Pittsfield called Coltsville, four miles east of the village. The settlement consists of a dozen houses, lying in a narrow valley, along the banks of a rapid stream. For several years past, fever has prevailed there every summer, and the cause has been a puzzle. The stream is rapid, its bottom stony, and it also contains considerable chloride of lime from the paper-mill. This year there were five cases there, and two deaths. I visited the locality, in company with another member of the town Board of Health, and examined the houses where the cases existed. One of the houses where a fatal case occurred was supplied with drinking water from a well close to the edge of the piazza. The well was loosely covered with boards, and all the house slops were thrown out immediately around, so that they must of necessity trickle down the well, and every rain must wash down a considerable quantity of filth. In addition to this, a barnyard, four or five rods from the house, contained a very large pool of stagnant water, without any outlet, and covered with a thick layer of green slime. This pool, which is several rods in extent, has existed for several years. Persons driving past the house in the evening have complained of the offensive exhalations from this pool.

"Another house where a fatal case occurred this year, and another last year, is supplied with water from a very old well dug just at the edge of the barnyard so as to supply both the stock and the house. In cleaning it out this fall, pieces of rotten wood and a dead toad were found in it. In every other respect the premises were remarkably unobjectionable.

"The house adjoining this, in which another case occurred, was excessively filthy. We were satisfied, from our inspection, that the fever epidemics at Coltsville are the natural result of a neglect of local sanitary precautions.

"These are the only cases of typhoid fever which possess any special interest."

"To my report on typhoid fever, sent a few days ago, I wish to add the following figures:—

"Deaths in Pittsfield from all causes, from Jan. 1st to Dec. 14, 1871, ... 103

"Deaths from typhoid fever, ... 6

"I wish also to add that, in the last week of June, two fatal cases of dysentery occurred in one family, in children, of a very malignant type. The house was contiguous to a large tannery, and the children had been playing in a shed containing a large quantity of green hides, which, from the warm weather, were extremely offensive. This seemed to me a case of cause and effect."

Pembroke.—"There is one locality, along the margin of a small stream, where the land is low and damp and particularly subject to fogs, in which there are a comparatively large number of cases of 'hay fever.' I have never thought there were relatively more cases of phthisis here than elsewhere."

Plympton.—Rheumatism and scarlatina are the prevalent diseases, "owing to sudden changes of temperature, and from dry to wet. The soil in most of the localities where these diseases prevail is wet and impervious to water, and the air is loaded with dampness from low and swampy lands."

Quincy.—"During the past two years consumption has been more prevalent than at any other period in the ten years during which I have been in practice here. In the autumn of 1870 bowel complaints, frequently associated with bronchitis, prevailed to a great extent among the poorer classes, and frequently proved fatal. The soil where such diseases have prevailed has been low and damp, and air has been rendered foul by imperfect drainage and filth. Sunlight has had free access."

Rochester.—"Typhoid and scarlet fevers are frequent; but the cause cannot very rationally be accounted for. Our soil is dry and the atmosphere is generally good. We have but little marshy soil."

Southbridge.—A physician in Southbridge (not our correspondent appointed by the town), sends us the following interesting information concerning typhoid fever:—

"The causes of typhoid fever is a subject which, of course, has engaged the attention of every thoughtful and observing practitioner of middle age for many years of his life. I have no theories to obtrude upon the attention of the learned world nor criticisms to make upon the studies or reports of others. But many years of observation, confirmed by testimonies of our brethren, has led me to believe that this fell agent of disease and death has an origin that eludes not less than mystifies the observer, and I could

wish the influence of the agency in question might be a matter of inquiry during the coming season; it is this, that a majority of cases of typhoid fever actually occur in *newly built houses*, or at least a very large proportion of the cases. At first sight this may challenge criticism, but close inquiry will induce respect for the statement. In sixteen of the reports from different towns from which your report of the last year is made up, the concurrence of these facts is either personally known to me or the circumstances stated in detail leave no doubt of the coincidence. For example, statements from Worcester, Somerville, Williamstown, Ashland, &c., correspond so exactly with a state of things occurringin my own observation in 1836 and in 1854, and are confirmed by so many repetitions as to lead me to look for typhoid fever as the attendant upon new growths of population in and around large towns and manufacturing villages, as often as a spirit of enterprise or unusual prosperity calls for increase of house accommodation. Pardon the details of '36 and '52 in this town. In 1836 the building of a large mill called for the erection of a new boarding-house of brick, which was constructed one hundred and fifty feet long and three stories high, on a dry, gravelly knoll, drained by a rapid brook which ran at its base. This house was filled with boarders, young and middle-aged, drawn from the farm-houses of the middling farming class. In August, typhoid fever broke out in the house and was a constant inmate for many months; the next year it reappeared and also the year following, but never since to so great an extent, although it now and then, as in all villages and houses, presents itself, but not in a virulent form.

"In 1852 the erection of another new mill made necessary another new boarding-house, which was erected (of wood, three stories in height) upon the opposite side of the river and upon similar soil, though not having the same facilities for drainage. The first year of its opening was followed by similar results, the occurrence of typhoid fever and dysentery among its inmates, prevailing to a serious extent and only abating with the appearance of frost. The number of cases I cannot give as I kept no notes; but I can aver that in each case the proportion of cases to the whole number of cases in the vicinity was three or four times as great.

"The year following, this disease made its appearance again in the form of typhoid dysentery, which was checked by sending each new case away from the house.

"These are only two of the many instances in which, in my observation, typhoid fever has followed the opening of the soil, so that I feel justified in directing attention to it as one of the excit-

ing causes of a much dreaded disease. Observation has led me to question the causative force of decaying animal matter, as under the most favoring circumstances it has seemed to fail in producing decided results; as in sieges, when its influence would concur with oth er exciting causes; these eliminated, there seems no proof of its power in the direction of causing typhoid,—at least this was my experience through a protracted siege during the summer heat of the lower Mississippi. *Terrestrial emanations*, then, seem to me to exercise a stronger influence and to be worth more study by the profession as a cause of typhoid fever than they have received. The great influence these exert as a disturbing force, is more manifest in another of their phenomena not well recognized or understood by the profession, and that is their agency in the development of influenzas. During the winter, whenever the temperature rises to a degree sufficient to thaw the frozen earth, catarrhal fever reigns epidemic; if the ground is covered with snow, or the changes, however great, do not release the frost, this does not occur. This rule may not be without exception, but the rate of exception to occurrence is so small as to leave no doubt of the rule, as any one may demonstrate by noting or remembering the circumstances as they occur. This explains why invalid persons, confined to close and well-warmed rooms, enjoy no protection from the invasion of influenzas; a subtle *something* is released from the broken surface and disseminated through the atmosphere, and everybody 'takes cold.'"

Sheffield.—Rheumatic, typhoid and bilious fevers common. "The enteric fevers proceed from local causes, as bad water and foul air from privies. Bilious fevers and rheumatism are caused by stagnant water and dampness of the air. The Housatonic River runs the entire length of the town; it has a fall of only thirty feet, which makes a sluggish current and much stagnant water."

Shirley.—In an experience of thirty years, consumption appears to have been the most common disease in the village. The location is moderately elevated, with north-east and north-west exposure. Soil impervious; a meadow adjacent. "Most of the cellars are subject to standing water in the spring and after severe rains." Better drainage is suggested as an improvement.

Shrewsbury.—Diseases of the respiratory organs prevail. Consumption more fatal than usual; accounted for by "the unusually rapid atmospheric changes, and by prevailing easterly winds, without regard to diversities of soil, air and sunlight."

Somerset.—"Pulmonary and bilious complaints are common." The town is exposed to high, easterly winds and sudden changes. The soil is dry and the air is pure.

Somerville.—"In this city our population is rapidly increasing," and new houses are being extensively built; so there is less probability of sickness than in an old and densely populated place. Our population is made up, in great proportion, of the young and middle-aged. Our city is being well drained and fully supplied with pure Mystic water. Our people are adopting the best sanitary measures for the health and comfort of all in our school-houses and other public buildings."

Stoneham.—"The soil is, in general dry, sandy, with sections of marshy land in several parts of the town. The locality is high. The air is often rendered foul by emanations from factories, piggeries, privies, etc. As regards the latter, little has been done in the use of dry earth. The subject has several times been laid before members of the Board of Health, but no action has been taken. In my opinion, the emanations from piggeries and privies are more offensive and injurious than those from public works. Sunlight has free access in most localities, the exception being groups of tenement houses in the very centre of the town; these are very deficient in this respect."

Swampscott.—"Bronchial and lung diseases" prevalent. Situation exposed, with cold and damp easterly winds from the ocean.

Walpole.—"During the last winter and spring (1871) there were an unusual number of cases of pneumonia, and influenza might almost be said to have been universal. I am inclined to attribute the latter disease to exhalations from dead vegetable matter which was unusually exposed to sun and air by the absence of snow on the ground."

Webster.—Diseases of the respiratory organs most common; next, typhoid fever. The former are attributed to the heavy fogs which rise from the river. The soil is generally dry and pervious to water; the situation is low, but not marshy nor exposed to trying winds; the air is pure, and drainage is good.

West Newbury.—Rheumatism and diseases of the lungs prevalent. Soil, wet and impervious; exposure to east winds; some dwellings too much shaded.

West Springfield.—"Houses too much shaded, so that they are rendered damp." Cellars also are damp, their level being below that of river high-water, so that in spring they are flooded.

Williamstown.—Scarlatina prevalent. "Sufficient care is not taken to stamp out the disease; it spreads through infection rather than through contagion."

Wrentham.—Consumption and pneumonia are specially prevalent, dependent on no distinctive local conditions.

Woburn.—"There are no diseases *specially* prevalent in this town, unless they be diseases of the respiratory organs, or throat and lung diseases, both acute and chronic. In a population of eight thousand there were one hundred and forty deaths in 1870. Of these twenty-six were from consumption, nineteen were from cholera infantum, and only three from typhoid fever. Woburn seems to have been peculiarly exempt from typhoid during the past ten years.

"Dampness seems the cause of much of the lung and throat disease prevailing here, and operates in a variety of ways. The soil is wet. There is water in the cellars in many locations during the spring and fall. There are too many shade trees around dwellings. There is much overcrowding in tenements in low situations. The surface of the town is undulating,—hill and valley; the soil generally impervious to water, and full of springs in both high and low situations."

Upton.—"Consumption is the prevalent disease, due, in part, among females, to overwork on bonnets and hats. The soil is porous on the low lands, moist from springs on the uplands. The air is pure and the sunlight free."

AN ACT

ESTABLISHING THE STATE BOARD OF HEALTH.

